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APRIL 6, 1998 VOLUME 15, NUMBER 14

NetworkWorld

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CHARLIE HILL

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REVIEW: Packeteer's entry is tops among four bandwidth managers, products that help you get your priorities straight when it comes to LAN-to-WAN traffic flows. Page 37.

Cisco bails on fast token ring

By Jim Duffy
Framingham, Mass.

Citing a lack of market demand for 100M bit/sec token-ring LANs, Cisco Systems, Inc. last week withdrew from the High-Speed Token Ring Alliance (HSTRA).

The alliance, a vendor group formed last summer largely to raise user awareness rather than develop technical specifications, originally consisted of token-ring leaders IBM, Madge Networks, Inc. and five other companies.

"With our customers, we have found very little interest in High-Speed Token Ring," said Randall Campbell, a Cisco

See **Token ring,** *page 55*

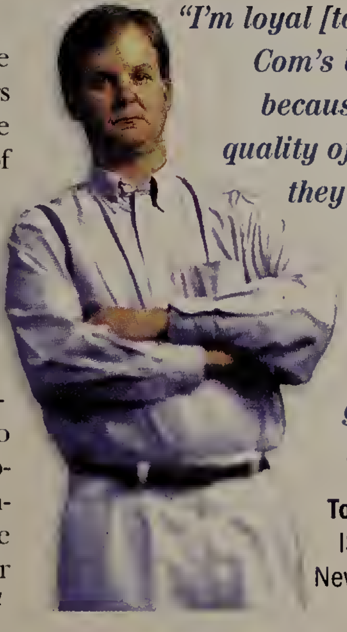
MCI/WorldCom merger: Bad to the backbone?

By Denise Pappalardo

The U.S. Department of Justice is investigating it, service providers are protesting it, and even the Communications Workers of America (CWA) is rallying against it. But users don't seem to think the planned merger between MCI and WorldCom will negatively affect Internet services.

MCI/WorldCom would become the second-largest telecommunications carrier. But the two carriers' potent Internet properties are now the primary stumbling blocks to a merger, because the government and merger

See **MCI/WorldCom,** *page 14*



SHAWN HENRY

"I'm loyal [to WorldCom's UUNET] because of the quality of service they offer. If the QoS is not there... we're going to switch."

Tod Bryant,
IS director,
New York Life

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Cabletron in chaos

Struggling internetwork vendor sends CEO Don Reed packing after only seven months.

By Robin Schreier Hohman
Rochester, N.H.

In the eyes of many observers, it took Cabletron Systems, Inc. co-founder Craig Benson only 30 minutes to destroy what CEO Don Reed spent seven painstaking months trying to build: a credible and stable management team.

A half-hour is how long it took Cabletron during a teleconference last Monday to explain Reed's departure and Benson's power grab. The news that Reed was out and that Benson, who owns nearly 13% of Cabletron's shares, was in as CEO, surprised everyone.

Many observers, including key customers, were left wondering about the very future of this network products mainstay.

It was a tumultuous week indeed for Cabletron, as other company executives either resigned or were fired. Word also surfaced that Cabletron co-founder and Reed predecessor Robert Levine was seen at the company's headquarters here, sending shock waves throughout Cabletron and the network community. One critic who asked not to be identified called it "the return of the Mutt and Jeff show."

A Cabletron spokesperson would say only that Levine was here last week to give advice to new Operations President John d'Auguste. The flamboyant and controversial Levine, who owns nearly 8% of Cabletron's stock, left the company in August.

Since that time, Cabletron's stock price has dropped by 50%, and the company has posted its first-ever quarterly loss. Still, many Cabletron customers found the news of Reed's departure disturbing.

"Reed brought credibility to the marketplace, where Benson doesn't," said Roland Voyages, director of technical services at NationsBanc Montgomery

See **Cabletron,** *page 55*

DAVE BRADLEY

REED TAKES A HIKE

Cabletron co-founder Craig Benson (below) takes complete charge as CEO Don Reed (right) leaves abruptly.

AT&T to dive into LAN management

By David Rohde
Durham, N.C.

AT&T plans to push past the router all the way down to the server in its drive to take over more network management responsibilities for large enterprises.

The carrier later this year will add a server monitoring service to its Managed Network Solutions family of offerings. Until now, these offerings have focused largely on configuration and monitoring of routers and frame relay access devices.

Under the new service, technicians at AT&T's Global Client Support Center here will be able to monitor corporate application servers across dozens or even hundreds of sites. AT&T will watch for excessive CPU utilization, disk space exhaustion, performance degradation and other problems.

Using tools such as Microsoft Corp.'s Systems Management Server and Novell, Inc.'s ManageWise, AT&T also will assume responsibility for distributing software electronically and tracking hardware and software inventories. The idea is to relieve corporate network administrators of product life-cycle and asset management headaches, and to help administrators assess the impact of application upgrades on WAN parameters, such as frame relay port speeds and circuit speeds.

AT&T officials conceded that the carrier has to take a number of steps before it can commercialize the server monitoring service, much less win contracts. The first of those steps will be taken today, when AT&T announces Version 6.0 of its Global Enterprise Management System (GEMS).

Installed at AT&T support

See **AT&T,** *page 56*

Get more online:

- ○ Overviews of the software AT&T will be using
- ○ Tips for getting the best outsourcing deal
- ○ A look at AT&T's recently announced managed firewall service

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Find out how you can evaluate your remote network management provider. Page 33.

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NETSCAPE GIVES IT AWAY

Free source code sparks ideas and parties. Page 6.

VPN BONUS PRIZE

With proper security, Winn Schwartau says VPNs can do more than you're being led to believe. Page 35.

FIREWALLS DOUSED

Many devices flunk security tests, firewall guru Cafarcio says. Page 29.

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NetworkWorld Blue Ribbon

REVIEW: *Packeteer tops pack of four bandwidth managers, products that help you get your priorities straight when it comes to LAN-to-WAN traffic flows.* **Page 37.**

CHARLIE HILL

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NetworkWorld Fusion
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This Week

Only on Fusion

Start-ups. Santa Barbara, Calif., thinks it has what it takes to tackle mighty Silicon Valley – a growing crop of software ventures, well-educated workers and a strong private/public partnership. But it also has little available land and outrageous housing prices. We take a look at what's happening in the county that's begun calling itself Silicon Beach. **DocFinder: 6543**

Carriers. Who will dominate the global network infrastructure in coming years? One reader argues that today's telephone companies, no matter how plodding they may seem, will win the race toward the network for the next millennium. What do you think? **DocFinder: 6546**

Name That 'Toon! The results are in and our august panel of judges has spoken: They have a winner in the first Name That 'Toon competition. And the winner is? Well, you'll have to come online to find out. **DocFinder: 6545**

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News briefs, April 6, 1998

FCC working on 'Net charge compromise

Internet data traffic, but not IP voice, would be protected from new regulatory charges in a compromise being worked out by the Federal Communications Commission.

The FCC is preparing to report Friday to Congress on whether Internet service providers should support universal service, which funds rural phone line installation and school subsidies. Sources said the FCC likely will propose that Internet telephony vendors should pay the same fees now levied on long-distance carriers to support universal service.

According to a well-placed source, the new charge would apply only to phone-to-phone service carried over a service provider's IP gateway, not Internet calls based on IP telephony software loaded on PCs.

Unfiltered spam

If Usenet spam has seemed heavier these past few days, there is a reason: A loosely knit confederation of antispammers, who claim they delete junk messages that account for 40% of Usenet traffic, last week announced they would cease their cleanup activities for an unspecified period of time.

The moratorium is designed to highlight the true extent of Usenet spam and enlist more active support from Internet service providers and the public.

The antispammers routinely delete junk postings by issuing "cancel" messages, which instruct a server to eliminate a particular item.

'Net's nefarious spammer gets spiked

The Internet's most notorious spammer, Sanford Wallace of Cyber Promotions, in Dresher, Pa., has agreed to pay a $2 million settlement to Earthlink Network, Inc., an Internet service provider in Pasadena, Calif.

The consent decree filed in Los Angeles County Superior Court stipulates that Wallace will pay an additional $1 million should he or any of his clients spam any Earthlink customers. While this and earlier court judgments have effectively put Cyber Promotions out of business, the setbacks may not mean the end for Wallace as a bulk e-mailer. He continues to tout a plan for a backbone network that would cater solely to spammers.

Worker shortage solution

The U.S. Senate Judiciary Committee last week approved the American Competitiveness Act, a bill that sponsors said could help ease the shortage of highly skilled technology workers. The bill, which still needs Senate approval, raises the number of H-1B technology worker visas that can be issued this year to 95,000, an increase of 30,000.

The bill also protects U.S. workers: Companies that lay off U.S. employees and then hire employees on H-1B visas for less money could be fined up to $25,000 per violation. These companies could also be barred from participating in employment immigration programs for two years.

The bill has been endorsed by the CEOs of 14 technology companies, including Cisco Systems, Inc., Intel Corp., Microsoft Corp., Netscape Communications Corp. and Sun Microsystems, Inc.

Speaking of layoffs . . .

Cable & Wireless, Inc. and GTE Corp. last week separately announced plans to lay off 1,500 workers apiece. Cable & Wireless cited a corporatewide restructuring program as the reason for the company's layoffs. GTE said its layoffs were a result of business unit realignment and an attempt to reduce operational costs by $500 million. GTE also said it expects to generate $2 billion to $3 billion by selling some of its wire-line operations.

Netscape releases free source code

Developers rush to improve new Communicator client software suite.

By Andy Eddy
Mountain View, Calif.

Netscape Communications Corp. last week released the source code for its upcoming Communicator client suite, and developers went after it with a vengeance. Within hours, a legion of anxious programmers had begun downloading and scrutinizing the code, hoping to squash bugs, make improvements and ensure that their favorite browser keeps its market share lead.

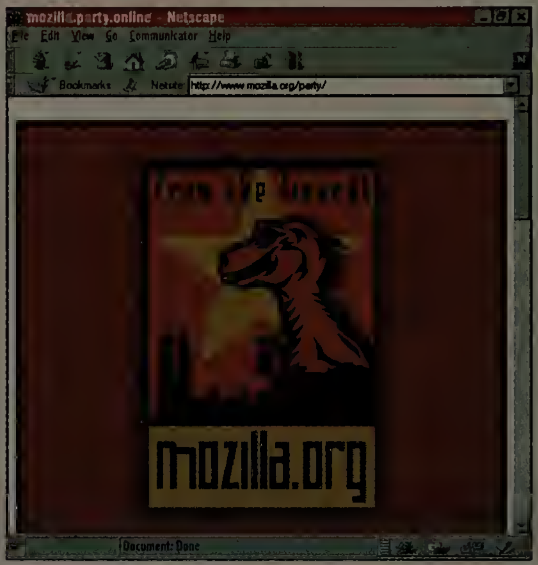
Since January, when Netscape announced plans to make the source code public, a vibrant grass-roots fraternity of developers has taken root. Wish lists have been compiled and newsgroups have been set up to inspire comment from the masses (*NW*, Feb. 9, page 14). Netscape created the mozilla. org site as a sort of town square for information and a location from which to get the actual source code release.

One of the lingering concerns regarding the Communicator code release has been the terms on which the code will be licensed. Netscape has settled on a blend of licenses similar to those that have governed the development of such applications as the Apache HTTP Server and Linux operating system.

If a developer modifies the Communicator source code, the resulting software is covered under the Netscape Public License (NPL). But if outside code is added, such as customized cryptography or an API that adds functionality, the software can be governed by any license the programmer chooses, such as Netscape's Mozilla Public License.

The two licensing methods will enable Netscape to incorporate any changes covered by the NPL into any future "branded" versions of Communicator and subsequent source code releases. But the licensing strategy also gives developers the ability to combine new additions with Netscape's code to create proprietary commercial products.

"I think [Netscape] did the smart thing by allowing both commercial vendors and free-software volunteers to participate. It'll be not only good for the product, but good for Netscape and people's view of [Netscape] in the marketplace," said Bob Weiner, CEO of Altrasoft, Inc., a San Jose, Calif., developer of productivity software for enterprise companies. His company is studying the possibility of adding its to-do manager to the Netscape code base and selling the resulting package.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The release of Communicator *source code resembles a political movement.*

Ideas abound

The newsgroups at news.mozilla.org are filled with people suggesting ideas and discussing how the ideas can be implemented.

Among the concepts being discussed:

- The need to ensure that Communicator remains a cross-platform product and proposals on what platforms it should be ported to.
- What products can and should be integrated with Communicator.
- What improvements can be made to the user interface.
- How to increase the number of e-mail accounts that can be tracked and an expansion of e-mail message filtering.
- The possibility of modularizing Communicator's elements so users can install the applications they need and not take up hard-drive space with the applications they don't use.
- How to improve the handling of bookmarks.

The Communicator source code release is in some respects incomplete. For example, the source code doesn't incorporate Version 5.0 components of Messenger, Collabra or Calendar. Nor does the release include third-party code from firms that didn't give their permission to use it, including Sun Microsystems, Inc.'s Java code.

What the source code release does include is Netscape's first take on Aurora, technology based on Resource Description Framework, which Netscape claims will provide better searching and browsing capabilities; XML support; and Open Java VM Interface, which enables the use of various Java Virtual Machines. ■

Program 'til dinner, party 'til dawn

In an almost unprecedented show of solidarity, individuals around the world last week threw parties to celebrate the public release of Netscape Communications Corp.'s Communicator source code.

The cornerstone event was held just north of Netscape headquarters at the Sound Factory in San Francisco on April 1, a day after the code release. Once the announcement was made about the party (on the mozilla.org Web site), others caught the spirit and set up similarly themed parties at sites around the world — from Philadelphia to Amsterdam.

The Seattle event, set up by Paul Phillips, chief technology officer for go2net, Inc., was actually the first, and was held the night before Netscape's unofficial bash. Phillips' party maxed out at around 100 people.

The Sound Factory fête was jammed from its 8 p.m. opening, pushing the 1,300-person capacity to its maximum and featuring a line of hundreds waiting to get in. Inside, it was a nightclub atmosphere with a nerdy twist: pulsing music, security men with headsets, free CDs (featuring applications) and a dance floor amalgamation of glitter kids and code monkeys. Eavesdropping brought as much information on upcoming must-attend parties as it did on plug-ins and programming techniques.

—*Andy Eddy*

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HotSpot vigil continues

Sun's technology for speeding up Java is on the slow track.

By Chris Nerney

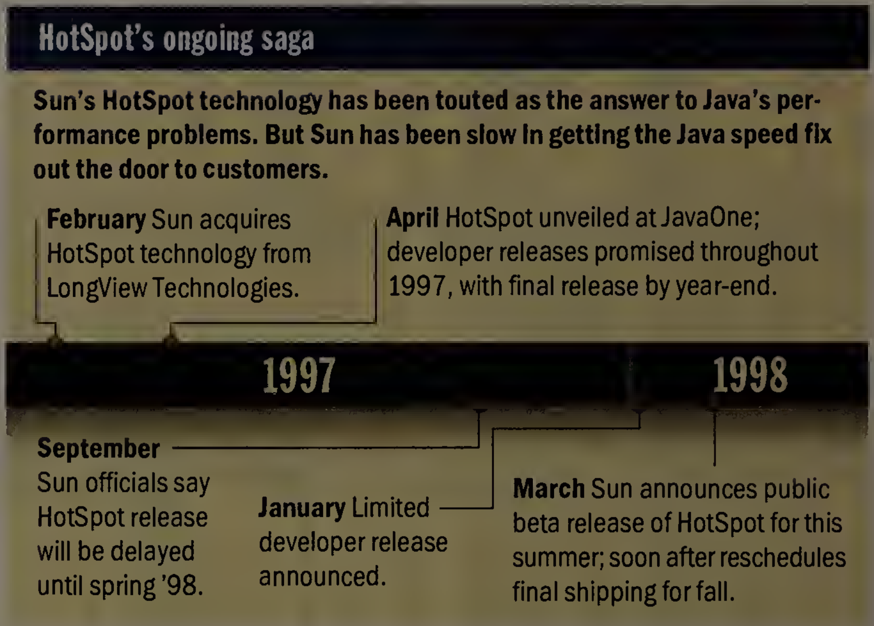
The HotSpot watch goes on.

Sun Microsystems, Inc. has again pushed back the release of its HotSpot technology, this time from summer to fall.

It is the latest in a series of delays for HotSpot, which Sun's JavaSoft division touts as the cross-platform antidote to Java's performance problems. Sun officials were unavailable for comment to explain the reasons for the latest delay.

Originally slated to be released with Java Development Kit 1.2 in late 1997, HotSpot's final shipping date has been rescheduled three times since last year (see graphic).

In recent months, Sun officials have promised that 1998 would be the year Java performance problems would be eliminated. That may indeed turn out to be true, but increasingly it looks as if those solutions will be provided by other vendors using platform-specific methods to help fill the void left by HotSpot's absence.



HotSpot's ongoing saga

Sun's HotSpot technology has been touted as the answer to Java's performance problems. But Sun has been slow in getting the Java speed fix out the door to customers.

1997

February Sun acquires HotSpot technology from LongView Technologies.

April HotSpot unveiled at JavaOne; developer releases promised throughout 1997, with final release by year-end.

September Sun officials say HotSpot release will be delayed until spring '98.

1998

January Limited developer release announced.

March Sun announces public beta release of HotSpot for this summer; soon after reschedules final shipping for fall.

"By the fall, you're going to have some serious momentum for alternative solutions that address Java performance more adequately than HotSpot," said Ron Rappaport, an analyst at Zona Research, Inc., of Redwood City, Calif.

IBM is now beta-testing a High Performance Compiler for Java that optimizes platform-specific code, while other vendors are developing native compilers designed to improve Java's performance on specific platforms.

One of those companies, Tower Technology Corp., of Austin, Texas, announced its own brand of platform-specific bytecode compilers for server-side Java applications at JavaOne.

Taking the LongView

When it acquired the HotSpot technology in early 1997 from start-up LongView Technologies, of Palo Alto, Calif., Sun claimed it had the magic bullet that would double the speed of Java applications running on any platform.

With the exception of a limited developers' release, HotSpot hasn't been seen outside the lab. And even when the technology finally makes it debut, Sun's Java strategy could further diminish HotSpot's importance.

Sun has made a big push to drive server-side Java development. But one developer said HotSpot's portability isn't particularly relevant on the server side.

"[HotSpot's] greatest benefit is on user interfaces or the client side, where dynamic portability is more important," said Dave Bailey, of Advanced Computing Technical Services, in Lancaster, Ohio. "On a server, a native compiler works really well."

Some firms are still fighting the Java performance battle in cross-platform style. Companies such as Symantec Corp. and Asymetrix Corp. sell just-in-time compilers that translate Java bytecode — the intermediate language in which Java is distributed — as an application runs. ■

Compaq crashes Gigabit party

By Tim Greene

Houston

Compaq Computer Corp. last week introduced a pair of Gigabit Ethernet switches — yet another effort by the company to play a bigger role in the network equipment market.

As expected, Compaq's fixed configuration switches come courtesy of an OEM agreement with Extreme Networks, Inc., a Cupertino, Calif., start-up that was among the first companies into the Gigabit Ethernet market (*NW*, March 23, page 8).

Compaq's new 5411 workgroup switch sports eight 10/100M bit/sec Ethernet ports, three Gigabit Ethernet ports and an 8.5G bit/sec backplane. The company's other new offering, the 5422 backbone switch, has double the ports of the 5411, as well as a 17.5G bit/sec backplane.

Both devices perform wire-speed switching and IP routing. The switches include policy-based quality-of-service capabilities as well, which enable companies to guarantee that time-sensitive traffic gets the bandwidth it needs.

While the 5411 and 5422 are priced competitively — $18,040 and $23,710, respectively — analysts said it remains to be seen if customers will look to satisfy their network equipment needs through Compaq.

The server and PC giant has acquired several network product vendors in recent years in order to establish a presence in the network equipment market.

Michael Sherwood, MIS director for the city of Oceanside, Calif., said he's buying Gigabit Ethernet switches from Compaq because the devices are are less expensive than those from Cisco Systems, Inc., Bay Networks, Inc. and Lucent Technologies, Inc.

"I can't justify $60,000 or $70,000 for a box for 20 or 30 users," Sherwood said. He has installed six of the Compaq switches to speed transfers between engineering workstations and centrally located servers.

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This week's question:

What is the area code for Research Triangle Park, N.C.?

Sun-IBM deal aimed at reviving NC market

By Chris Nerney

Looking to rally the flagging network computer (NC) market around a single platform, Sun Microsystems, Inc. and IBM said they will co-develop and market a new Java operating system.

While some industry observers say the alliance could solidify the NC market by providing potential customers with a standard platform, they also wonder if the plan raises more questions than it answers.

"It's a reaffirmation that [Sun and IBM] are going to have a single [operating system] for the NC device, which is good," said Tim Sloane, an analyst with Boston-based Aberdeen Group, Inc. "It's a nice step, but it's a baby step because they didn't also spell out what other areas are going to be consistent."

The new operating system software, called JavaOS for Business, will be available this summer to NC OEMs, independent software vendors, and distributors, according to Sun and IBM officials.

JavaOS for Business will be shipped with IBM's high-end Network Station NCs, set for release in early 1999. Over the next year Sun will replace the JavaOS for NCs, included in its just-shipped JavaStation product, with JavaOS for Business.

"This will accelerate the adoption of a single Java platform for [NCs]," claimed Art Olbert, IBM's vice president of business development for network computing software.

JavaOS for Business is designed for applications such as claims processing, banking, inventory management and help centers. The applications are stored and managed on the server.

The Sun-IBM deal also is intended to kick-start the NC market, which has suffered from a lack of applications and the lack of a standard platform.

"Turning to IBM was a pragmatic move by Sun," said Ron Rappaport, an analyst at Zona Research, Inc., in Redwood City, Calif. "IBM can deliver Java-based NCs to the masses."

While Sun previously had developed Java operating systems on its own, JavaOS for Business will be a collaborative effort between engineers from both companies.

Sun officials said JavaOS for Business will be based on JavaOS for NCs, but will feature improved performance and manageability, additional languages and the ability to easily implement new device drivers.

IBM's Olbert: *JavaOS for Business will accelerate the drive toward a single operating system for NCs.*

Neither Sun nor IBM officials would discuss additional details, particularly whether the new product would use operating system technology developed by Chorus Systems S.A., which Sun acquired last fall. At that time, Sun officials had said Sun's various operating systems for embedded systems would be based on ChorusOS.

Other Java-based operating systems developed by Sun include JavaOS for Consumers, which is included in the PersonalJava software designed to run on devices such as Web phones and set-top boxes. JavaOS for Consumers is scheduled to be available next week to OEMs. ■

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E-Stamp: No lick, no stick, just click

By Paul McNamara
Washington, D.C.

Your IT department may soon merge with the mail room.

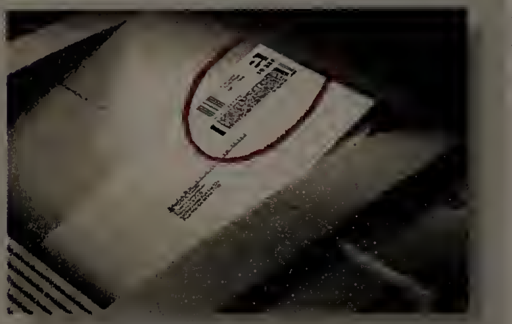
Here's why: E-Stamp, Inc. last week received unprecedented permission from the United States Postal Service to begin public tests of a software/hardware package for buying postage via the Internet. The company initially is aiming its product at the small office/home office PC market, but plans to ship a client/server version early next year designed for larger companies or departments.

"Our goal is to postage-enable every Internet-connected desktop and to provide a secure electronic commerce platform for postal services for the 21st century," said Nicole Eagan, vice president of marketing at E-Stamp, a Palo Alto, Calif.-based start-up. E-Stamp is partnering with Microsoft Corp., AT&T Ventures and Hewlett-Packard Co. "We [foresee] large companies actually creating an intranet post office, just like we have created an Internet post office," Eagan added.

E-Stamp Internet Postage consists of PC software and a small stainless steel-encased security device that attaches to a user's printer port. The device, which features 1,024-bit encryption, stores the amount of postage value a customer purchases from E-Stamp's Web site using a credit card, electronic funds transfer or check.

Postage of the future

When E-Stamp Internet Postage begins shipping later this year, users will be able to print postage directly onto a piece of paper, a label or an envelope, as pictured below.



Once a bulk postage value is downloaded, E-Stamp's so-called SmartStamps can be printed via the toolbar of any postage-enabled application. SmartStamps can be printed onto envelopes, mailing labels or pieces of paper. The beta version of the product works with Microsoft Word and the Outlook e-mail client.

"We're working with other software [companies] to hopefully postage-enable all of the major applications out there that will create content for the mail stream," Eagan said.

The security capabilities of E-Stamp Internet Postage were of particular concern to the Postal Service, which annually does more than $30 billion worth of business in stamps and metered mail.

"[The package] has to be secure because the computer users are literally printing money," said Sandra Harding, a spokeswoman for the Postal Service. "We have to make sure that we're getting paid for the postage that's used."

The debut of E-Stamp last week at a Washington, D.C. press event featuring Postmaster General Marvin Runyon, represented the first new method of generating U.S. postage since mechanical meters were invented 78 years ago. E-Stamp is not the only company looking to cash in on PC postage, as meter makers Pitney-Bowes, Inc., of Stamford, Conn., and Paris-based Neopost are among those seeking Postal Service permission to run live beta tests on their products.

One industry analyst, however, believes E-Stamp has established a significant lead over its would-be competitors.

"E-Stamp appears to be the only entrepreneurial entity that is focused on this, and new ventures have a unique ability to bring more capital and more focus to developing new technologies," said Vernon Keenan, a senior analyst with Zona Research, Inc., in Redwood City, Calif.

Scheduled to ship by year-end, the E-Stamp package is expected to cost $199. ■

EDI standards-bearer sees XML writing on the wall

Data Interchange Standards Association is investigating XML/EDI backward compatibility issues.

By Ellen Messmer
Orlando

For a quarter-century, electronic data interchange standards for purchase orders and other documents have been the basis for electronic commerce between large businesses.

But last week, the official U.S. EDI standards-bearer, the Data Interchange Standards Association (DISA), said traditional ANSI X12 EDI is likely to be replaced by a newer Web-oriented technology called Extensible Markup Language (XML). Among other things, XML is expected to make life easier for small companies to do business electronically.

One looming issue, though, is whether XML, approved by the World Wide Web Consortium (W3C), will be backward-compatible with existing EDI technology.

"There are a lot of synergies between XML and EDI," said DISA President Judy Kilpatrick, speaking here at the organization's annual convention. "We're not sure, though, if you can encode an XML transaction as EDI, or take the semantics around EDI and put them into XML Data Type Definitions. We have high hopes we can take advantage of all the work that's gone into EDI."

XML is a language that can be used to write format-neutral documents containing structured data. The XML specification was approved just last month as a W3C standard, and products are now beginning to appear that will let companies process XML forms or database searches via the World Wide Web.

DISA has joined with the government-funded CommerceNet Consortium to determine just how compatible XML will be with EDI technology.

By July, the results of this investigation should be in, said Rik Drummond, president of The Drummond Group, a Fort Worth, Texas, consultancy contributing technical expertise to the effort. But early indications are that substantial barriers to XML/EDI compatibility exist, he said.

For example, the ANSI X12 EDI structure lets users program "if/then loops" in business logic. But this is something XML cannot yet do, Drummond said.

"Loops in X12 are important, and XML doesn't yet solve that common business problem," he said. XML may prove fine for electronic catalogs, but not for more complex EDI processes.

Nevertheless, the ANSI Accredited Standards Committee (ASC) X12, which coordinates EDI standards development under DISA, wants to get out of the business of writing EDI standards.

"We're repositioning the X12 committee to incorporate EDI with all the other [electronic commerce] technologies, such as XML, Java and data mining," said Kendra Martin, ASC X12 chairwoman and manager of electronic commerce at The American Petroleum Institute.

DISA's Kilpatrick *sees XML as the future.*

"A lot of our older EDI transaction sets are just electronic versions of paper documents," Martin said. "We need to think more about business modeling."

The ASC X12 committee "is no longer going to be concerned about application-level syntax," Martin said. "We're going to get out of the technology business and let people whose business it is get on with [the technology development]."

"There are a lot of electronic commerce vendors out there who have never heard of EDI," said ASC X12 Vice Chairman Charley Quirt, network manager at Datex-Oh-meda, a Tewksbury, Mass., medical equipment supplier. "We want to find the appropriate bridges from current EDI to the future."

One cultural problem is that EDI users and their familiar software and service providers are not among the parties driving XML. Rather, it is the likes of Sun Microsystems, Inc. and Microsoft Corp. that are behind XML's rise.

The XML/EDI Group was founded in July to help bridge the gap between the old and new technologies. To date, the 400-member organization has been active mainly as a discussion group on the Web at www.hmledi.com. ■

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Boundless touts terminals’ ability to run Java applets

Company claims terminals paired with Microsoft’s Windows Terminal Server can compete with PCs and network computers.

By John Cox

Hauppauge, N.Y.

Early test results show that Java applets may run as fast on terminals linked to Microsoft Corp.’s new Windows Terminal Server (WTS) as they can on a typical office PC or even some Java-oriented network computers (NC).

The WTS test was conducted by terminal vendor Boundless Technologies, Inc., based here, and the results were compared with those published by Pendragon Software Corp., developer of the CaffeineMark 3.0 applet for testing Java performance.

Boundless’ test involved running the Internet Explorer 4.0 browser on a WTS machine and letting users of Boundless’ Viewpoint TC 200 Windows terminal access the browser to run Java applets. WTS is Microsoft’s server-based, multiuser version of Windows NT 4.0 and is designed to serve up applications to terminal users. The terminal-WTS combination’s positive test results, if substantiated by independent user findings, could reassure customers that Java can perform well even where terminals are used.

Based on preliminary results, the Java code ran about as fast on a two-processor server with WTS as it did on a “typical” business PC (see graphic). The Boundless test used the initial beta version of WTS on an Intergraph Corp. server with two 266-MHz Pentium II processors. According to the CaffeineMark scale, the terminal-WTS combination had a 461 score, while the PC scored 449.

However, a PC powered with an Intel Corp. processor and loaded with 64M bytes of RAM far outstripped all other machines tested, scoring 1,347 on Boundless’ test.

Still, Boundless executives said the company’s test should dispel fears that Java applications on WTS will be too slow.

“Customers were concerned about having to run a Java browser on the WTS server, because presumably this would degrade performance as you added users,” said Chad Oliver, Boundless’ product manager for thin-client computing.

Boundless officials also noted that the terminal configuration outperformed Neoware Systems, Inc.’s @workStation NC. The NC, equipped with 32M bytes of RAM, a 66-MHz Intel i960 RISC chip and Netscape Communications Corp. Navigator 3.0, had a CaffeineMark score of just 48.

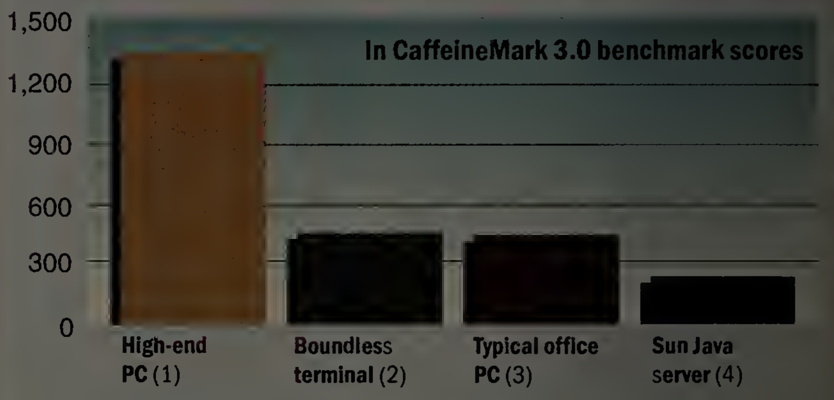
Boundless can’t sit still, though. Neoware and other NC vendors are boosting processors and software to optimize their NC product lines in order to run Java applications.

But WTS beta testers like the idea of rolling out terminals because these devices are the thinnest of clients.

“You design a front end that runs on the WTS server instead of at the user’s end of the wire,” said Rick Smith, vice president of information systems at House of Blues Entertainment, Inc., in West Hollywood, Calif. “So your performance is excellent.” ■

BREWING JAVA ON WINDOWS TERMINAL SERVER

Tests by terminal vendor Boundless show that Java applications on Microsoft’s Windows Terminal Server run about as fast as they do on a “typical” office PC, but still run much slower than they do on a top-of-the-line PC. The higher the CaffeineMark, the faster the application runs.



(1) Windows NT, AMD K6 200-MHz processor, 64M bytes of RAM, 512K bytes of Level 2 cache, Navigator 4.0

(2) Fifteen terminals linked to server with two 266-MHz Pentium II processors, 120M bytes of RAM, Windows Terminal Server (beta), pICAsso software (beta), Internet Explorer 4.0

(3) Windows 95, 90-MHz processor, 128M bytes of RAM, 256K of bytes Level 2 cache, Navigator 4.0

(4) Sun Ultra II 1200, UltraSparc 200-MHz processor, 128M bytes of RAM, Hot Java

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MCI/WorldCom

Continued from page 1

opponents are concerned that MCI/WorldCom would have a stranglehold on the ’Net backbone market.

“It sounds like [MCI/WorldCom] will obviously gain market share, but based on new technology developments and the increased demand for bandwidth, I can only see prices going down,” said Tod Bryant, director of information systems at New York Life Benefit Services, Inc., a Norwood, Mass., company.

The performance and quality of service that New York Life gets from Internet service provider UUNET Technologies, Inc., has a direct impact on the benefits firm. New York Life is running a Web-based 401k application for its customers.

While most executives at MCI and WorldCom say the merged companies will support only about 20% of Internet backbone traffic, industry analysts beg to differ.

“It’s easy to speculate MCI/WorldCom will have over 50% of the Internet market share, but it doesn’t really matter,” said Johna Till Johnson, program director for global network strategies at META Group, Inc., a Stamford, Conn.-based consulting firm.

Even if MCI/WorldCom did have a monopoly, Johnson said such a situation wouldn’t last. All it takes is a couple of really savvy competitors to move in and take business from a monopoly, she said.

> ***“MCI and WorldCom will not have any competitive advantage until their networks are one, but that’s going to be a long time from now.”***
>
> **Dwight Gibbs**, chief technical “fool,” The Motley Fool

“It’s time everyone wakes up and smells the bits,” said Ken McGee, vice president at Gartner Group, Inc., a consulting firm in Stamford. Yes, MCI/WorldCom will probably support a majority of Internet traffic, but that will not prevent other ISPs from being competitive, he said.

Yet, those opposing the merger, such as GTE Corp., Sprint Corp. and the CWA, are claiming MCI/WorldCom’s dominant position in the market will hurt users and adversely affect Internet backbone competition.

This majority stake in the Internet “will create a situation where it will no longer be in MCI/WorldCom’s best interest to maintain high-quality interconnections with other ISPs,” said John Curran, chief technical officer at GTE Internetworking.

Curran and others are concerned that if MCI/WorldCom has an overwhelming Internet backbone advantage, the company will be able to win and retain customers with unparalleled ease.

And other organizations, such as the Internet Service Provider Consortium (ISPC), a group of 165 small and regional ISPs, believe the merged company will take advantage of its leadership position by changing interconnection policies and contracts or raising prices, said Deborah Howard, executive director of ISPC and a founding partner at 2Cow Herd, an ISP in Venice Beach, Calif.

But business customers are not buying into the naysaying.

“What are [the merged companies] going to do that will be so bad?” asked Dwight Gibbs, chief technical “fool” at The Motley Fool, a financial advisory company that primarily operates on the ’Net. “If they jack up prices, Sprint and AT&T are going to be happy to undercut their prices to win that business.”

To ensure redundancy, The Motley Fool uses three different ISPs — UUNET, ANS Communications and @Work, a division of @Home Networks — to provision three dedicated connections.

“MCI and WorldCom will not have any competitive advantage until their networks are joined, and that’s going to be a long time from now,” Gibbs said. Until then, MCI/WorldCom will be operating like two separate companies with more interconnections between their networks, he said.

The overall impact of this merger will be positive for business users because all of the other ISPs will need to provide the same level of service as the merged companies, said Glenn Botkin, information systems engineer at Galaxy Science Corp., a Tucker, Ga.-based engineering firm.

Users agree there would be more need for concern if there were only a few ISPs operating the Internet backbone today, but that is not the case. In fact, a handful of providers have sprung up in just the past year that will continue to increase competition and most likely drive prices down.

But none of the MCI/WorldCom opponents is talking about new carriers such as Qwest Communications International, Inc., Level 3 Communications, IXC Communications Corp. or Frontier Corp. Qwest, Level 3 and IXC today are building nationwide, high-bandwidth IP networks.

These companies would not be able to get into this market if a true monopoly existed, Johnson said. It simply does not make sense to say the joining of two of the over 20 backbone providers will stunt competition, she said.

On the other hand, AT&T has been curiously quiet about the merger. Perhaps AT&T doesn’t want to stir up any trouble with its pending TCG Communications acquisition. ■

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New software to boost Microsoft's Windows Terminal Server

New Moon Software's Booster product can double the number of users per WTS machine by divvying up processing chores.

By John Cox
Santa Clara, Calif.

New software from a California start-up may dramatically improve the performance of Microsoft Corp.'s upcoming Windows Terminal Server (WTS).

New Moon Software, Inc., based here, claimed that its Booster software nearly doubled the number of users possible on a beta version of WTS. WTS modifies Windows NT Server 4.0 to serve up Windows screens to attached terminals.

Here's how Booster works: Instead of loading applications on WTS and running them there, a user loads applications on one or more separate computers running standard NT Server 4.0. Then the user loads part of Booster on the WTS computer and the main part of Booster on the NT application servers.

Booster then divides the application processing between the back-end servers and WTS. The back-end servers handle the heavy computational work, and Booster lets WTS take care of the processing needed to create and show displays.

"That's smart, because [Booster] liberates the terminal server to do what it was intended to do — create a pretty picture on a video screen hundreds or even thousands of miles away," said Sheldon Cwinn, vice president of sales for InterSolutions, Inc., a systems integrator in Montreal.

One of Cwinn's clients currently runs a Microsoft Access database application on a beta version of WTS.

"It's very slow," he said, referring to the database application. "There is so much front-end processing that the server has to do, that the back-end processing doesn't get priority."

Cwinn this week plans to demonstrate for this client how Booster can improve performance.

Booster's approach differs from the one being proposed by Microsoft and development partner Citrix Systems, Inc. These companies generally position WTS to run applications in addition to serving the terminal displays.

The problem with that approach is that multiuser systems can eventually run out of steam, said Frank Mara, director of marketing for New Moon. And some applications may have to be changed, if only slightly, to run properly on WTS.

In contrast, Booster lets MIS groups deploy applications on separate, dedicated application servers, which handle all the computational processing. Applications run unchanged on standard NT 4.0 servers.

Mara said Booster eventually will support the full range of distributed behaviors in Microsoft's Distributed Component Object Model (DCOM), which connects software components over a network. WTS, which will be released by June, will have limited DCOM support.

Booster is a special version of New Moon LiftOff, a distributed processing product for Windows applications released last week.

LiftOff is available now, priced at $4,995 for a 10-user license. Booster, now in beta testing, will be ready soon after WTS ships. Pricing for Booster will be decided later.

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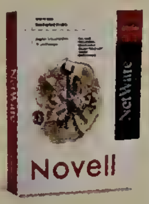
Local Networks

Covering: LAN Hubs, Switches and Management • Operating Systems • Servers • Thin Clients

Briefs

■ **Novell, Inc.** *last week announced a new version of its small-business server package that includes integrated messaging, backup, database and Web server software. Due later this month,* **NetWare for Small Business 4.11** *will come wrapped with Novell's GroupWise, Oracle Corp.'s Oracle8 database, Netscape Communications Corp.'s FastTrack Web server and Computer Associates International, Inc.'s ARCserve backup and Inoculan virus detection software.*



Pricing for NetWare for Small Business 4.11 starts at $595 for a five-user license.

© Novell: (800) 453-1267

■ **Network Appliances, Inc.** *announced a new version of the operating system for its mid-range and enterprise servers. This version,* **NetApp Data-ONTAP 5.0,** *permits the clustering of the devices for failover capacity. Using Fibre Channel subsystems, the storage capacity on the data servers has been increased 300% to 1.4 terabytes of data. The clustered NetApp data server will be available in June. Pricing starts at $200,000.*

© Network Appliances: (408) 367-3000

■ **Panasonic Office Products Co.** *has announced it will add a new technology to its digital copier line: the* **Hyper Document System (HDS).** *With HDS running on the LAN-attached digital copier, users can scan a document, store it and access the document remotely via a PC. The HDS is compatible with Windows, NetWare and Unix.*

HDS technology will be bundled in Panasonic's line of digital copiers this spring. Pricing was unavailable.

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In-Site

Software house switches from Cisco to Alteon

By Robin Schreier Hohman
Cupertino, Calif.

Portal Software, Inc. opened its doors as an Internet service provider in 1985. Nine years later the company decided there was more money to be made in selling the software it created to register, bill, track and manage subscribers than in providing a gateway to the Internet.

Making the transition from an Internet provider to a software shop required a change in the company's network. After Portal got rid of its service provider equipment, the company deployed a combination of Cisco Systems, Inc.'s Catalyst 1900 and 2820 Ethernet switches, providing switched 10M bit/sec access. Portal relied on a Sun Microsystems, Inc. Ultra server with 100M bit/sec ports to route among the corporate, testing group and engineering groups.

When Portal, which is located in part of what was the original Apple Computer, Inc. campus, decided to expand to a second building, Arnaldo Roldan-Suarez, Portal's manager of Information Services, was charged with upgrading the network. His requirements: support 100M bit/sec to the desktop for engineering; build a bigger backbone, set up virtual LANs, increase speed and support multimedia and video streaming across the campus.

He knew he wanted Gigabit Ethernet, and he first looked to Cisco. Roldan said he could have upgraded to a Cisco Catalyst 5500, but the best performance he could have gotten was an aggregate bandwidth of 800M bit/sec.

Cisco's second alternative was Catalyst 2820 switches, which would have only given the network 100M bit/sec. Roldan was mulling that over when a colleague suggested he call Alteon Networks, Inc. Roldan did, and liked what he heard.

He installed two Alteon ACEswitch 110 Gigabit Ethernet server switches and hooked them up to his existing Catalyst 1900 and 2820 switches. The ACEswitch 110 supports eight 10M/100M bit/sec ports and two Gigabit Ethernet ports.

In the next month or so, Roldan will install an Alteon ACEswitch 180, a high-performance switch with eight 10M/100M/1000M bit/sec ports plus a Gigabit Ethernet uplink. Roldan plans to connect that to an ACEswitch 110, the corporate firewall and a gaggle of servers, including an NT Exchange server, an NT file server and a Sun Solaris build server. He'll use Alteon's Gigabit Ethernet network interface cards to connect the servers to the 180. He'll also connect Catalyst 2924 XL 10M/100M autosensing switches to each ACE-switch 110.

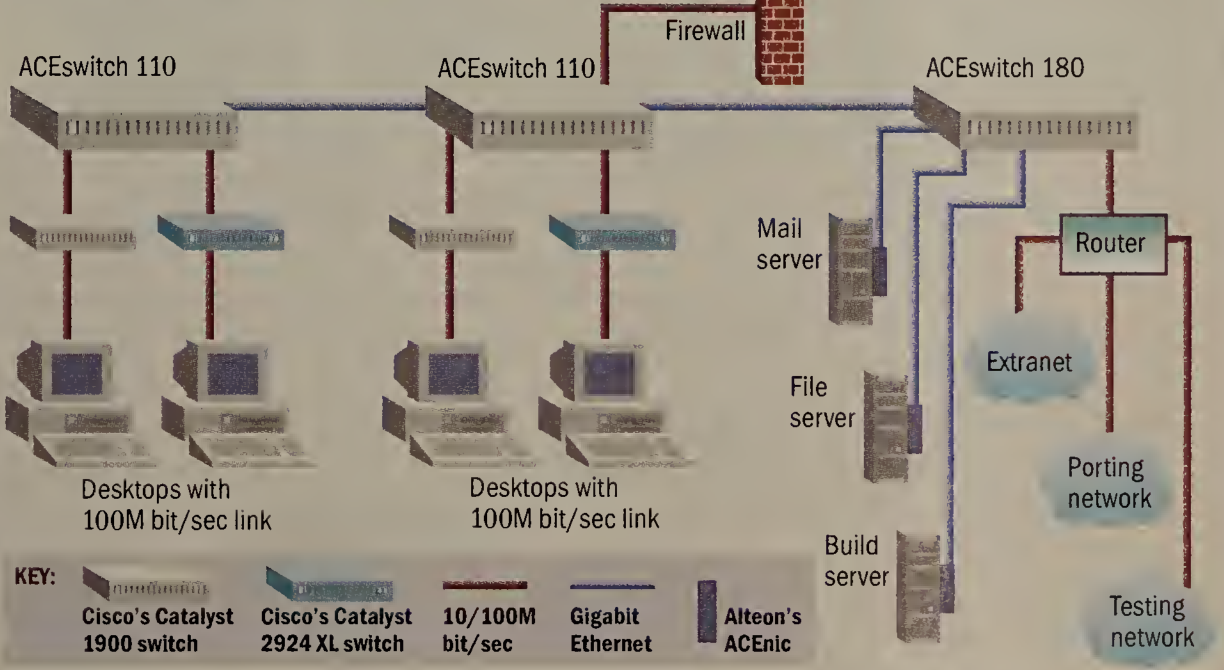
In addition, Roldan is very interested in implementing a VLAN for key engineers using Alteon's jumbo frames. He said that will allow him to off-load some wear and tear on the CPUs while getting up to 50% faster speeds.

Even though Roldan still likes Cisco, "We're looking at other vendors because even though Cisco is rock-solid, they lag a little behind technologically. That's why Alteon won this deal," he said.

© Alteon: (408) 360-5500

Portal's faster LAN

Portal Software went from using a software-based router at the center of a shared 10M bit/sec network to a Gigabit Ethernet backbone. The new network will use one of Alteon's ACEswitch 180s and two ACEswitch 110s to give switched access to each user.



Unix and NT: Marriage made in server heaven?

By Marc Songini

Unix and Windows NT, long considered irreconcilable enemies, may actually become bosom buddies.

A number of vendors, including partners Sequent Computer Systems, Inc. and Digital Equipment Corp., plan to offer servers that permit both operating systems to run simultaneously.

The vendors claim the move would allow IT managers to consolidate their servers, saving money and space, while improving manageability.

Digital, a leading Unix vendor, intends to come up with some type of Unix-NT server in the next two years, said Mark Silverberg, senior marketing manager at the company's Unix systems group.

Silverberg said Digital is working to integrate Unix and NT on the software and the hardware levels, but declined to elaborate.

"We see the demand coming from large enterprises, more in the financial and insurance industries," Silverberg said. "They've gone from the mainframe and now they're trying to get some sort of centralized man-

See **Unix,** *page 18*

WIRED WINDOWS

In the chips

The two big operating system engineering conferences were held a couple of weeks ago — Novell's BrainShare and Microsoft's WinHEC. While both were generally well received, the big winners weren't users, administrators or even software vendors. The guys who won big were certain chip manufacturers.

Dave Kearns

Intel was the biggest winner of all. Both conferences featured announcements that upcoming releases of NetWare and Windows NT would support Intel's Merced (also known as IA-64), a chip that features a 64-bit address space. Merced won't be the first 64-bit chip on the market, but it will be the first to have such widespread support right out of the gate. That's bad news for Motorola and IBM, whose PowerPC chips are generally acknowledged to have a better architecture than Intel's. AMD, Cyrix and the other Intel clone makers should also be heartened knowing they're on the right track.

The second group to win big are the RAM chip makers.

When the WinHEC attendees were asked, "What's the standard PC memory size in 1998?," 20% answered 32M bytes. For the desktop! How many of your desktops have 32M or more? The really scary part, though, is that 70% didn't consider 32M to be enough! Referring to those who thought 32M was about right, Jim Allchin of Microsoft's senior vice president of the Personal and Business Systems Group, said, "hopefully we'll convince you that it should be more than that."

Up through Windows NT 4.0, 32M bytes of RAM was (and is) considered sufficient for most people's needs. Evidently NT 5.0 is going to raise that memory size, perhaps even double it. And while Bill Gates claimed that Windows 98 would not need more resources than Windows 95, most Windows 98 beta testers will tell you a different story.

Novell, previously known for having a fairly RAM-lean server platform, was busy talking up NetWare 5 with its Java Virtual Machine built in, a free five-user copy of the Oracle database engine and lots of new server-side enhancements for GroupWise. That all adds up to the need for RAM, lots of RAM, on the server.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at wired@vquill.com.

Tip of the week

Here's a company to watch out for. Netoria, Inc. currently markets two Novell Directory Services (NDS) utilities; SFLogin (which allows contextless logons), and SFLock (which ties a screen saver to a user's NDS password) at a price as low as $3 per node. This doesn't sound like much until you realize there are more than one million registered nodes! Netoria has got one new product in the works that should win everybody's network product of the year award once it's introduced. The concept: allow administrators and users to embed rules within the NDS database. Watch www.netoria.com for announcements.

Unix

Continued from page 17

agement."

There are a variety of ways to execute this strategy, Silverberg said. For instance, Digital may offer a server that has both operating systems running on the same motherboard but has each group of CPUs functioning as separate systems.

Sequent also recently announced its NT-Unix integration roadmap, dubbed the Numa Center initiative, which would allow users to cluster servers in a mixed operating system environment.

The individual motherboards in the servers would be dedicated to either NT or Unix. To work together, the motherboards could have special physical wiring connections, and middleware.

Sequent plans to have some version of Numa Center out within the next year.

Who really needs it?

Letting NT and Unix run next to each other sounded good to one analyst, but he suggested vendors might want to make them interface. That would mean new challenges. "We have yet to see specific, tangible evidence that interoperability is there," said James Gruener, an analyst with Boston-based Aberdeen Group, Inc.

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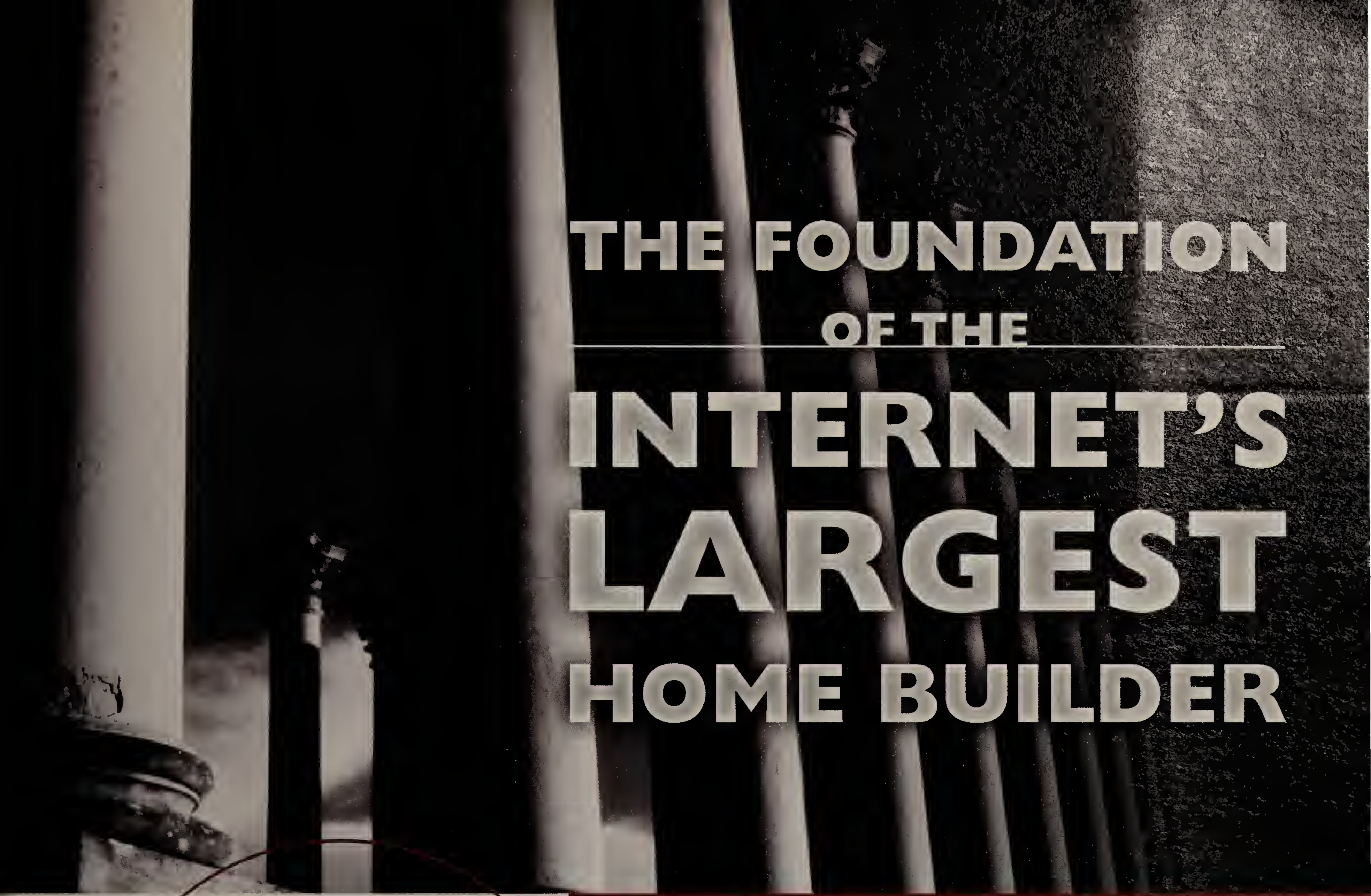

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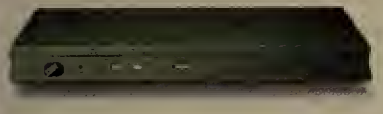
Briefs

■ *More details have emerged regarding* **Cisco Systems, Inc.'s** *upcoming — but unannounced —* **Catalyst 8500 Gigabit Ethernet switches.** *The two models in the Catalyst 8500 line are the 8510 and 8540.*

The 8510 is a five-slot, 5G bit/sec switch that can support 32 Fast Ethernet ports and four Gigabit Ethernet links. It will ship in June. The Catalyst 8540 is a 13-slot, 20G bit/sec switch that sports 128 Fast Ethernet ports and 16 Gigabit Ethernet ports. The switch will ship in September.

Pricing for the switches is not known at this time. Cisco is expected to announce the devices in April and show them at NetWorld+Interop 98 in May. Cisco declined to comment.

■ *For a limited time, if users buy an eligible* **IBM AS/400** *or* **RS/6000 server** *and purchase $10,000 or more worth of IBM 2210 Nways Multiprotocol Router products, they can receive a* **$1,000 rebate.**



IBM's 2210 *is part of rebate offer.*

To receive the rebate, all servers and routers must be installed on or after March 2 but no later than Sept. 30.

© IBM: (800) 426-2255

■ **LM Ericsson** *has announced label-switching product development and interoperability agreements with* **General DataComm, Inc. (GDC)** *and* **Bay Networks, Inc.** *Ericsson, GDC and Bay will build* **IP over ATM products** *that conform to the IETF's Multi-protocol Label Switching (MPLS) specification.*

GDC will enhance its APEX ATM Edge Switch to support MPLS, and Bay will add MPLS to its Backbone Node router. Ericsson will implement MPLS in its carrier-class core IP/ATM switching platforms, the AXI 530 line. Ericsson, GDC and Bay plan MPLS products for the fourth quarter.

Interlink boosts mainframe e-commerce suite

New software adds security control, data encryption and network management capabilities.

By Marc Songini

Interlink Computer Sciences, Inc. last week announced a software suite aimed at helping mainframe users manage TCP/IP nets and electronic commerce transactions.

The e-Access family of products will let users more easily configure and track problems on IP nets linked to a mainframe. The product family also includes new security software that will let users include end-to-end data encryption, access control and security policy management in electronic commerce transactions.

Business-to-business Internet commerce is expected to grow from $7.4 billion in 1997 to $33.7 billion in 2002. According to market research firm International Data Corp., in 1998 more than $20 billion in transactions will be completed on the World Wide Web, almost triple 1997's total.

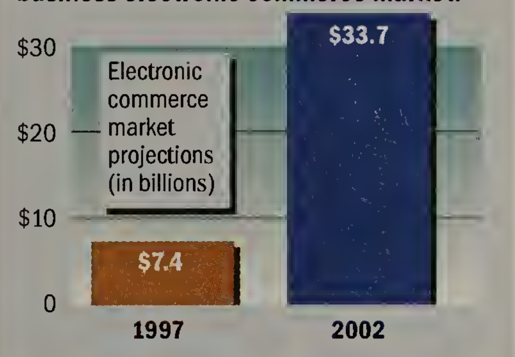
Much of this electronic commerce activity will require access to MVS servers because that is where the critical data continues to reside, said Bill Jones, director of marketing at Interlink.

At the heart of e-Access is the e-Control suite of management software. Residing on the mainframe, e-Control monitors the TCP/IP stack and communications functions of the mainframe to provide net configuration and administration, problem determination, performance analysis and capacity planning.

The e-Control suite includes a configuration and administration package for TCP/IP setup and auditing; diagnosis software for help desk problem determination and reporting; and a performance and capacity planning package for isolating network bottlenecks and providing real-time and historical analysis reports. E-Control can monitor IBM's TCP/IP for MVS or Interlink's TCPaccess stack.

PLENTY OF ROOM FOR GROWTH

Interlink's new mainframe product suite will exploit the growing business-to-business electronic commerce market.



SOURCE: IDC, FRAMINGHAM, MASS.

The e-Control suite lets users determine problems, such as a user's inability to access certain applications, within a TCP/IP protocol stack or VTAM. The suite can also help measure critical TCP/IP telnet and File Transfer Protocol (FTP) session performance — all from a single monitor.

To enable secure transactions, Interlink announced its e-Access Secure suite. The suite consists of NetLock, the firm's new user authentication system, and Sentinel/IP, Interlink's existing TCP/IP net access control package.

NetLock provides end-to-end data and network security required to pass data on a public network. For example, NetLock supports security algorithms from RSA Data Security, Inc. and Security Dynamics, Inc. to hide user data and passwords.

NetLock can control access to individual ports on switches as well as control secure FTP and telnet transactions, the company said.

Sentinel/IP supports policy-based management of TCP/IP connections working with access control facilities such as IBM's Resource Access Control Facility. Connections can be accepted or rejected on the basis of port, IP address, time of day or other user-defined criteria.

These products don't have many bells and whistles, but the basic components needed for electronic commerce are present, said Valerie O'Connell, senior analyst at Aberdeen Group, Inc., a consultancy in Boston. "It's a better mousetrap," she said.

The e-Access offerings will be available in June. Pricing was not available.

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- An e-Access overview
- Overviews of electronic commerce sessions at the recent Internet Commerce Expo

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CA boosts Unicenter's enterprise mgmt. role

By Jim Duffy
Islandia, N.Y.

Computer Associates International, Inc. (CA) recently announced several enhancements to its Unicenter TNG management software to allow users to control more of their enterprise.

CA and NCR Corp. plan to better integrate Unicenter TNG and NCR's Top End middleware by developing a Top End management agent. Top End is a transaction processing monitor for distributed computing environments. It is designed to ensure that applications can execute transactions regardless of underlying operating systems and hardware platforms.

The Unicenter TNG Top End agent will let Unicenter TNG users monitor Top End processes and receive alerts on critical events, such as a transaction disruption. Because the Top End agent is still in development, CA has not yet determined pricing and availability for the software.

For remote management, CA announced a remote control option for Unicenter TNG, which lets users view and change the configuration of servers and PCs from a remote site.

Unicenter of the universe

Recent Computer Associates activity with Unicenter TNG:

- Developing agent for NCR's Top End middleware
- Adding remote control option for remote site server and PC administration
- Integrating BMC's PatrolView application management suite

For example, systems administrators can discover the network, display a network map of resources and identify which PCs and servers are equipped with the remote control software. Then, with the click of a button, they can select the specific unit or units they wish to control.

Administrators at any location can be alerted of a software delivery failure, take control of a remote PC to inspect the target system, resolve the problem and reinitiate the software delivery from a standard or Web-based Unicenter TNG console.

The Unicenter TNG remote control option starts at $1,000 and is available now.

CA also announced an alliance with BMC Software, Inc. to better integrate BMC's PatrolView application management suite with Unicenter TNG. This will enable users to monitor Patrol agents from a Unicenter TNG console. As a result, users can view, monitor and manage applications and other resources managed by the PatrolView management suite from their Unicenter TNG consoles.

PatrolView for Unicenter TNG is expected in the second quarter. Pricing starts at $2,500.

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INTERNETWORKING MONITOR

The word from the Mountain on cells and frames

Lest you think I drift into spiritual metaphor here, let me begin by saying that I mean the headline of my column quite literally. I'm referring to a multivendor debate on the topic of cells vs. frames in the campus backbone that took place 9,000 feet up in the Swiss Alps.

No, it wasn't the result of a chance meeting on the slopes. The session I chaired was a formal part of NetEvents '98 Switzerland. (A transcript of the hour-long session makes interesting reading and is available from NetEvents at www.netevents.org). The event brought together senior executives and strategists from the world's major networking vendors along with some 60 press and analyst types from Europe, the Middle East and Africa.

My session was titled "Claiming the campus backbone: Will cells or frames prevail?" which, not coincidentally, was the topic of a column published here in February.

The panelists hailed from 3Com, Bay, Compaq, Extreme, FORE, HP, Madge and Newbridge. A bit unwieldy, but certainly a good balance of cell and frame proponents. (Cisco was not in attendance at NetEvents Switzerland.)

After enduring several "pro-frame" and "pro-cell" vendors each making pitches for their favorite technology, 3Com could remain silent no more. 3Com noted that what characterizes the "answers that we have had so far is vendors who do not have a credible alternative in both camps."

Kevin Tolly

The implication, of course, being that one should buy from a technology agnostic vendor like 3Com that offers both technologies. It could be true that such companies will sell you what best suits your needs. On the other hand, I've also heard executives of such companies bemoan the fact that their salespeople sell what is easiest for the salesperson.

With only one exception, the panel agreed that for jobs such as linking PBXs via trunk lines, ATM's circuit emulation was the way to do it. The exception? Extreme. True to its name, the company's position was extreme — insisting there was nothing that fast frames wouldn't be able to do given time to mature.

Also interesting was the general concurrence among the panel that timing plays a key role in the cells vs. frames debate. Your choices will vary dramatically depending on whether yours is a brand-new, all-IP network or an established network that still has to deal with IPX — which is all but ignored by the start-ups. The frame bigots maintain that every month their maturing products encroach on more of ATM's turf.

At the end of the hour, the press and analysts in attendance cast their votes. Only 6.67% believed frames would prevail. Another 16.67% thought that cells would, and 76.67% left the session believing that both would play significant roles in campus backbones of the future. Not what the frame vendors wanted to see but, of course, it could have been the altitude.

Tolly is president of The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. He can be reached at (732) 528-3300 or via the Internet at ktolly@tolly.com or www.tolly.com.

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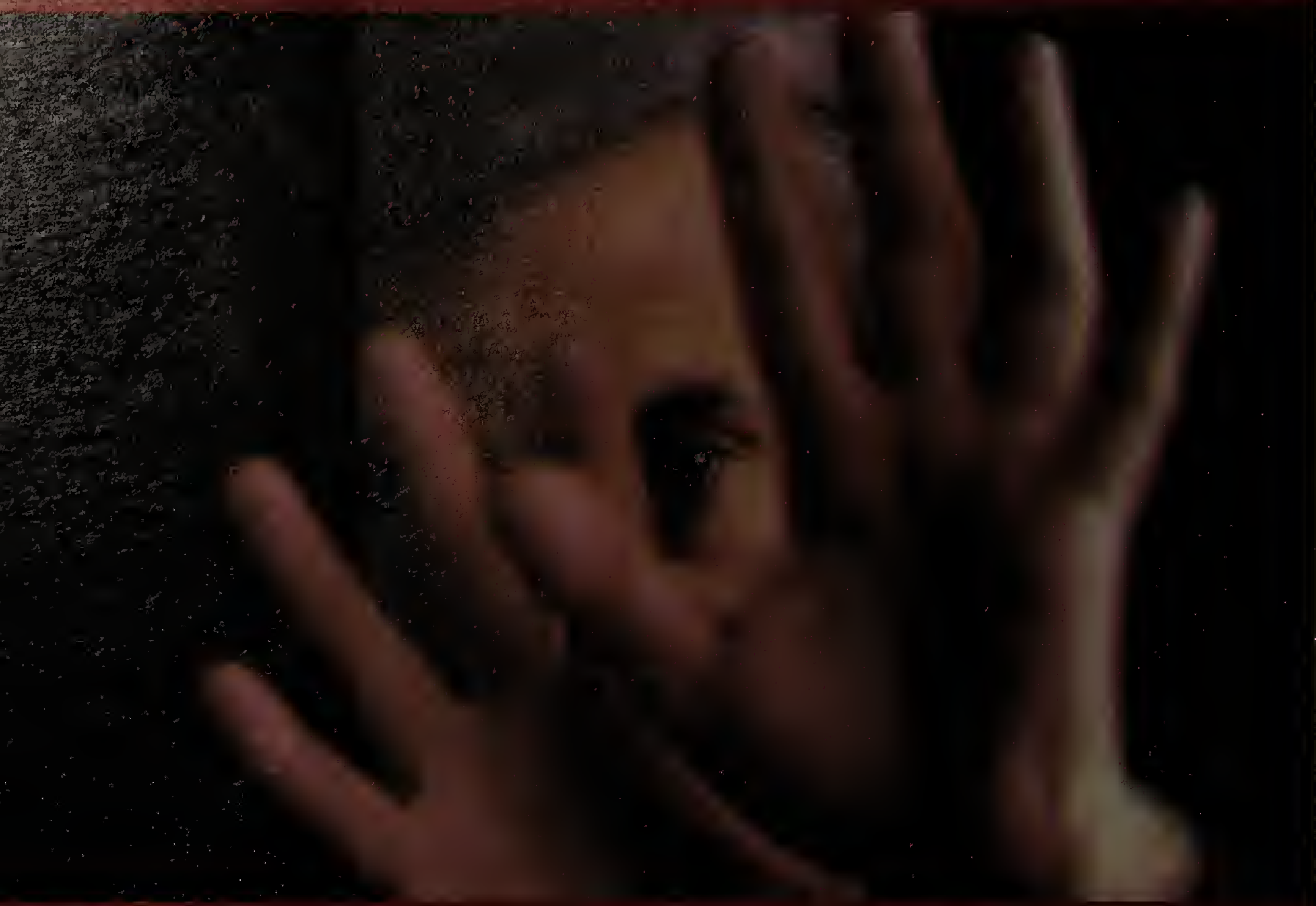

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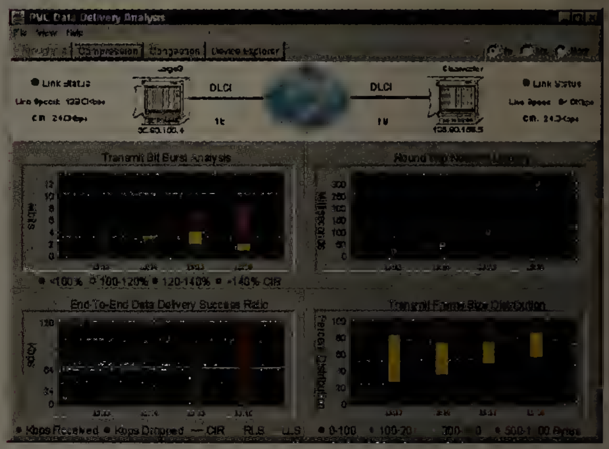

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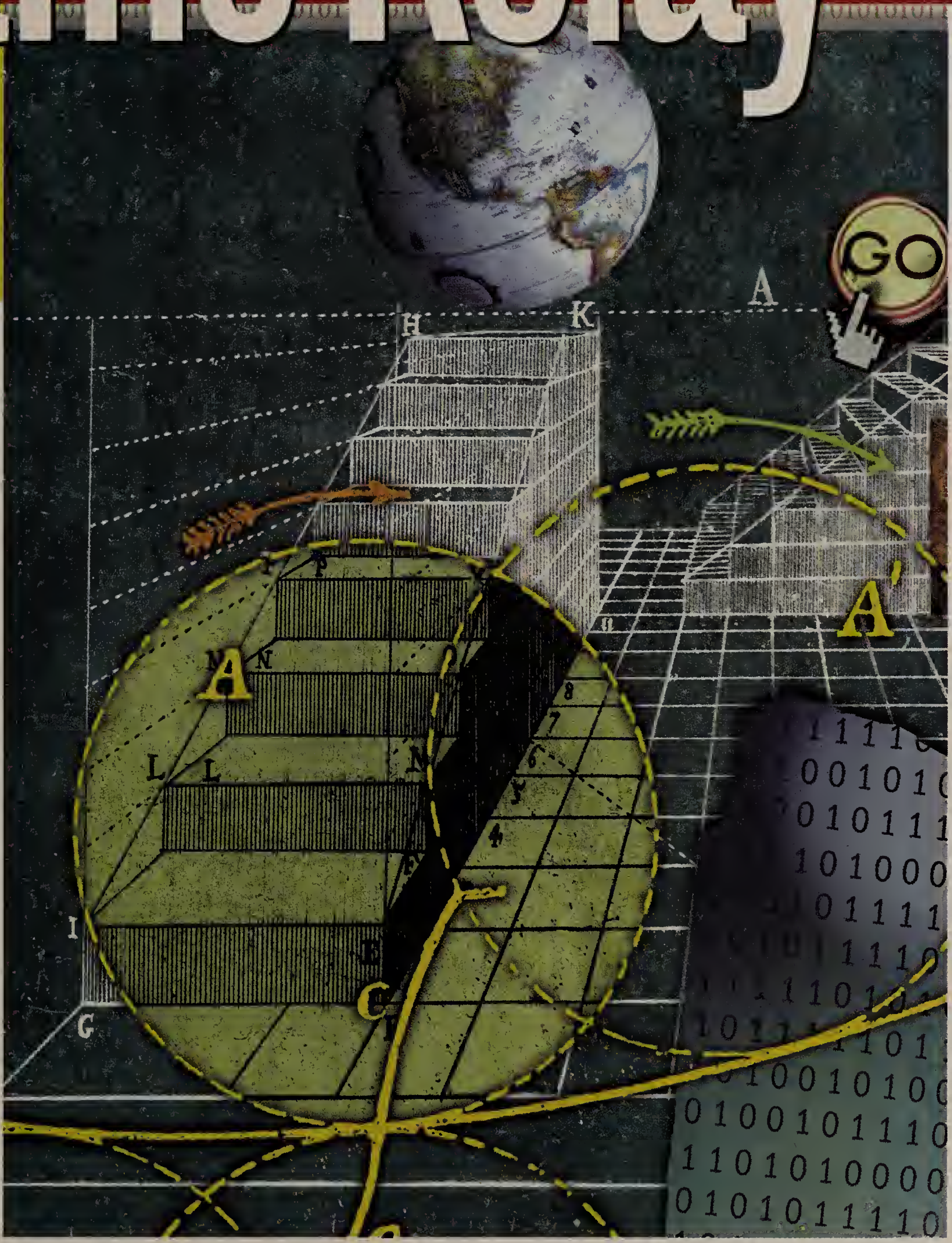

MARC YANKUS

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Frame Relay

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A Matter of Trust

Net managers can count on frame relay

WHILE TECHNOLOGIES like ATM, gigabit Ethernet, and others grab the headlines, frame relay has grabbed a huge share of what really matters, namely the trust and respect of network managers around the world. Nowhere is this affinity for frame relay more apparent than in the data outlining the dramatic and continuing growth in the use of frame relay, as you'll see when you read this special *NetworkWorld* supplement.

As time wears on, frame relay has simply gotten more robust, reliable and dependable. The technology has moved swiftly beyond initial applications as a replacement for leased lines for the WAN, to the point today where it is proving its mettle as a powerful medium for video and voice signals.

And frame relay continues to present an increasingly affordable way of moving digital data. With the advent of switched virtual circuits, network managers can consider buying only the bandwidth they need when they need it.

Let the pundits talk to themselves about the various emerging technologies. For problems and challenges that are here and now, frame relay is the common sense network choice.

MARC YANKUS

BILL LABERIS
EDITOR

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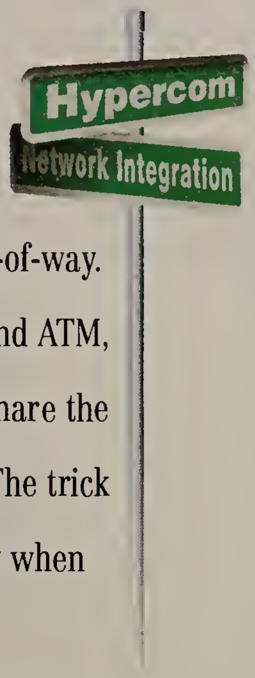
The Frame Relay Bandwagon

What began as a good idea for replacing leased data lines has blossomed into a great idea for moving voice, fax and video as well.

By Larry Greenstein

THERE ARE THOSE WHO SAY it is time to stick a fork in Integrated Services Digital Networks (ISDN), claiming it has been long on promise and short on delivery. But there is one narrowband ISDN service that, by any measure, is a clear winner among network managers and users alike: frame relay. ¶ Frame relay is a low-cost packet-switching protocol for connecting devices on a wide area network. Its enormous success is primarily due to a single dominant application in the marketplace: as a replacement for leased lines for interconnecting local area data networks. As a result, about 90% of the traffic carried on frame relay networks has been Internet Protocol (IP) traffic. ¶ But things have changed, and today we now see that

TIMOTHY COOK



Give All Of Your Applications The Green Light

Directing traffic on the wide area network used to be simple: SNA always had the right-of-way. But now, thanks to Frame Relay and ATM, voice and video applications can share the WAN with legacy and LAN data. The trick is to give them all the right-of-way when they need it.

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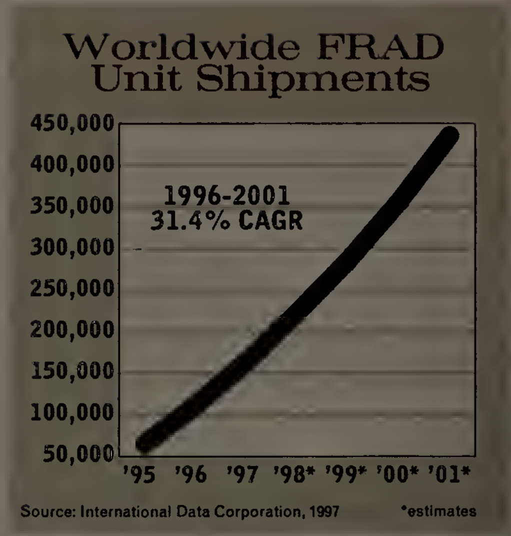
many other applications are migrating to frame relay. These applications are no longer simply LAN and IP centric. They include legacy data applications (async, bisync, HDLC, etc.) as well as applications not traditionally thought of as ISDN services, such as voice, fax, voice-band data, and videoconferencing. While the ISDN model never intended for these ISDN services to be delivered over frame relay (but rather alongside frame relay), economics has driven what was once thought impossible, and technology has delivered. ¶ For example, frame relay has an established track record for carrying the Systems Network Architecture (SNA) protocols, which are frequently used for financial and business applications. In addition, frame relay is particularly well suited to the scalability and performance demands of SNA networks and their applications. As a result, we are seeing a substantial increase in SNA over frame relay traffic.



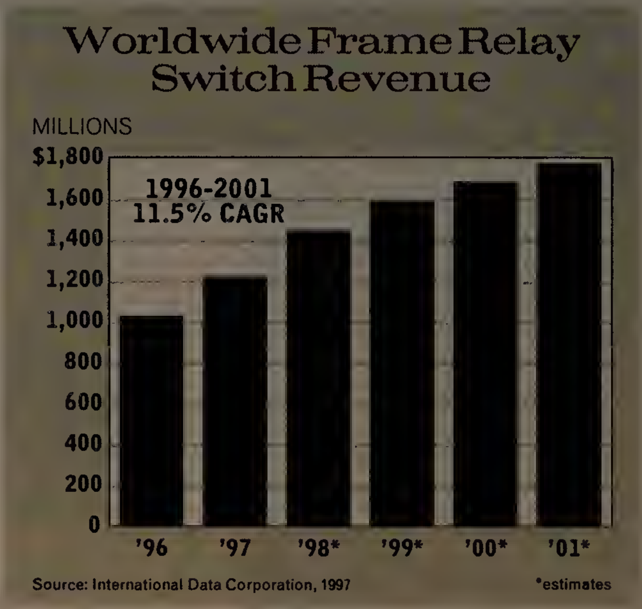
Worldwide FRAD Unit Shipments

Source: International Data Corporation, 1997 *estimates

We are seeing a substantial increase in SNA over frame relay traffic.

Traditionally, the digital traffic of banking and financial institutions has been carried over leased line network technology. Today, frame relay encryptors provide financial institutions with confidential and authenticated security over frame relay with the same degree of security provided by leased line encryptors. These encryptors bring to the user the economic advantages of frame relay by providing separate and unique security on every frame relay connection on the interface.

Realtime applications are also utilizing frame relay. These applications, such as video and voice communications, require the network to deliver traffic to the destination within a specified amount of time. If the network delay is too long or the delay varies too widely from one moment to the next, realtime applications suffer performance degradation. An example of realtime applications over frame relay has been the recent introduction of video codecs with an integrated frame relay interface. These video codecs and conferencing bridges often have the ability to interwork with industry standard H.320 ISDN video conferencing equipment.



Worldwide Frame Relay Switch Revenue

Source: International Data Corporation, 1997 *estimates

MORE VOICE APPLICATIONS

Also, we are seeing a great deal of activity in the voice applications marketplace, supported by some very innovative products. These products provide significant recurring cost savings by transporting voice, fax and voice-band data traffic over the corporate

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or public frame relay network. The elimination of toll charges for long distance corporate voice and fax traffic is so dramatic that the equipment payback period averages around six to nine months.

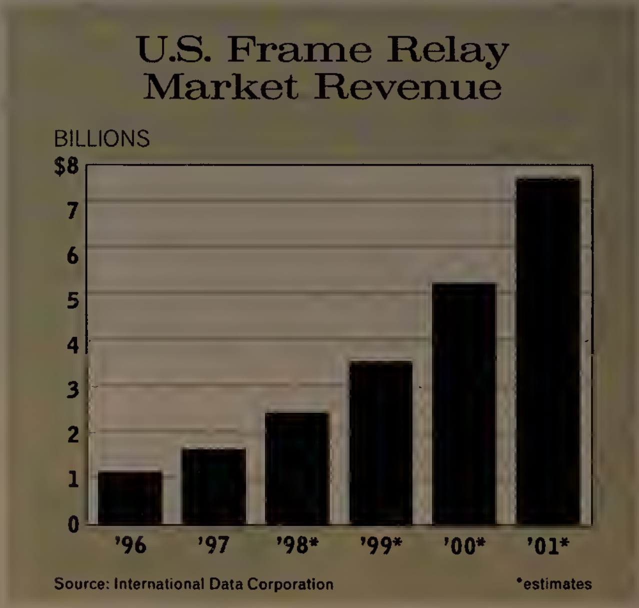
"I expect to see a growth rate of over 100% in 18 months for frame relay," says Amnon Presler, president, RAD Data Communications, Mahwah, N.J. "Growth in frame relay will be fueled by two factors. First, frame networks can be accessed from almost any location in the United States. Second, companies now realize that Voice over Frame Relay [VOFR] is a very reliable technology that produces significant cost savings."

To assure interoperability among Voice over Frame Relay equipment, the Frame Relay Forum, a vendor and user standards group based in Fremont, Calif., published the Voice over Frame Relay Implementation Agreement in May 1997.

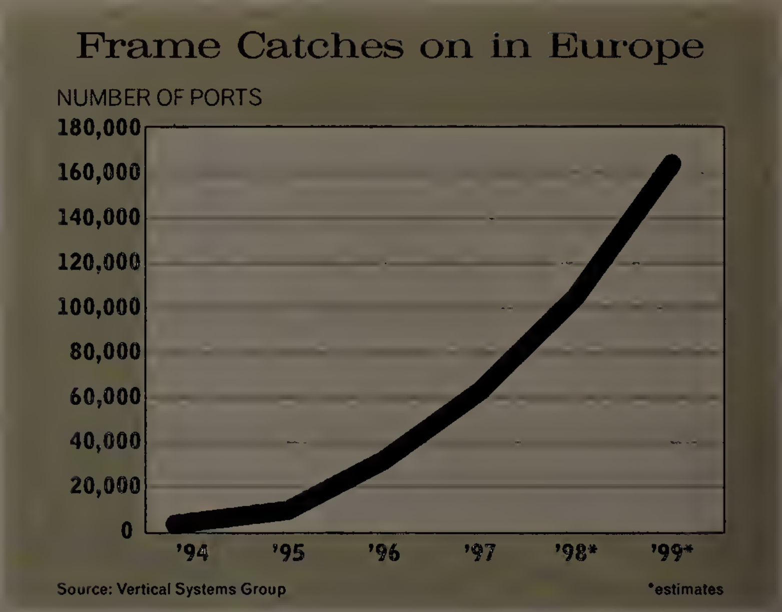
SORTING OUT THE ISSUES

The frame relay standards do not yet define parameters or procedures for delivering performance assurances (e.g., delay, delay variation, frame loss). But numerous equipment vendors are implementing equipment to deliver or use realtime service over frame relay.

Thus, the Frame Relay Forum is tasked with sorting out this issue, and lengthy discussions on this topic are now common at the Technical Committee. The objective is to define service levels in a way in which the service user can measure the service delivered.



Source: International Data Corporation *estimates



Source: Vertical Systems Group *estimates

Many innovative technology developments targeted at economic benefit to end users have been successful.

Additionally, the International Telecommunications Union (ITU) Study Group 7, Question 7 and Question 9 working groups, are in the final stages of drafting a revision to X.36 and X.37, which define the frame relay protocol at the User-to-Network Interface and the Network-to-Network Interface, respectively. This revision will include procedures for providing quality of service (QOS) based on Service Classes, Frame Transfer Priorities and Frame Discard Priorities.

The elimination of toll charges for long distance corporate voice and fax traffic is so dramatic that the equipment payback period averages around six to nine months.

Many innovative technology developments that are targeted at economic benefit to the end user have been very successful in the frame relay marketplace. This has contributed to the unprecedented growth and success of frame relay. The Frame Relay Forum will continue to track the development of new applications for frame relay in the marketplace and will strive to facilitate interoperability among equipment vendors and among service providers. ✳

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Picture This: Video over Frame Relay

By Randall D. Cronk

IT'S EASY TO UNDERSTAND why companies would want to use frame relay for video. Frame relay is the most widely deployed data transmission method in the world. It's also less expensive than ISDN, leased lines or ATM for the bursty kinds of data typical companies network most of the time. But what about video, which requires a continuous data stream in order to deliver images without the shadows, jitters and distortion so common in the early days of digital video?

"Video over frame relay is quite feasible, says Frank Dzubeck, president of Communications Network Architects, a Washington, D.C., consultancy. "The key issue is reliability. Virtually every router can deliver prioritization at the frame level today. In the frame world, prioritization is called SLA [service level agreement], rather than QOS [quality of service], the term used in the ATM world. SLA guarantees a minimum availability, a minimum amount of delay, and provides other types of service guarantees. These service levels can be monitored. AT&T, Sprint and MCI all have the ability to deliver this, and so do a number of ISPs."

MAKING ADJUSTMENTS

Another way network administrators can ensure picture quality is by reducing packet size. Frame relay allows the payload portion of packets to be adjusted to carry larger or smaller amounts of information. Since distortion is directly proportional to the amount of information dropped by a packet, reducing packet size reduces the potential for distortion.

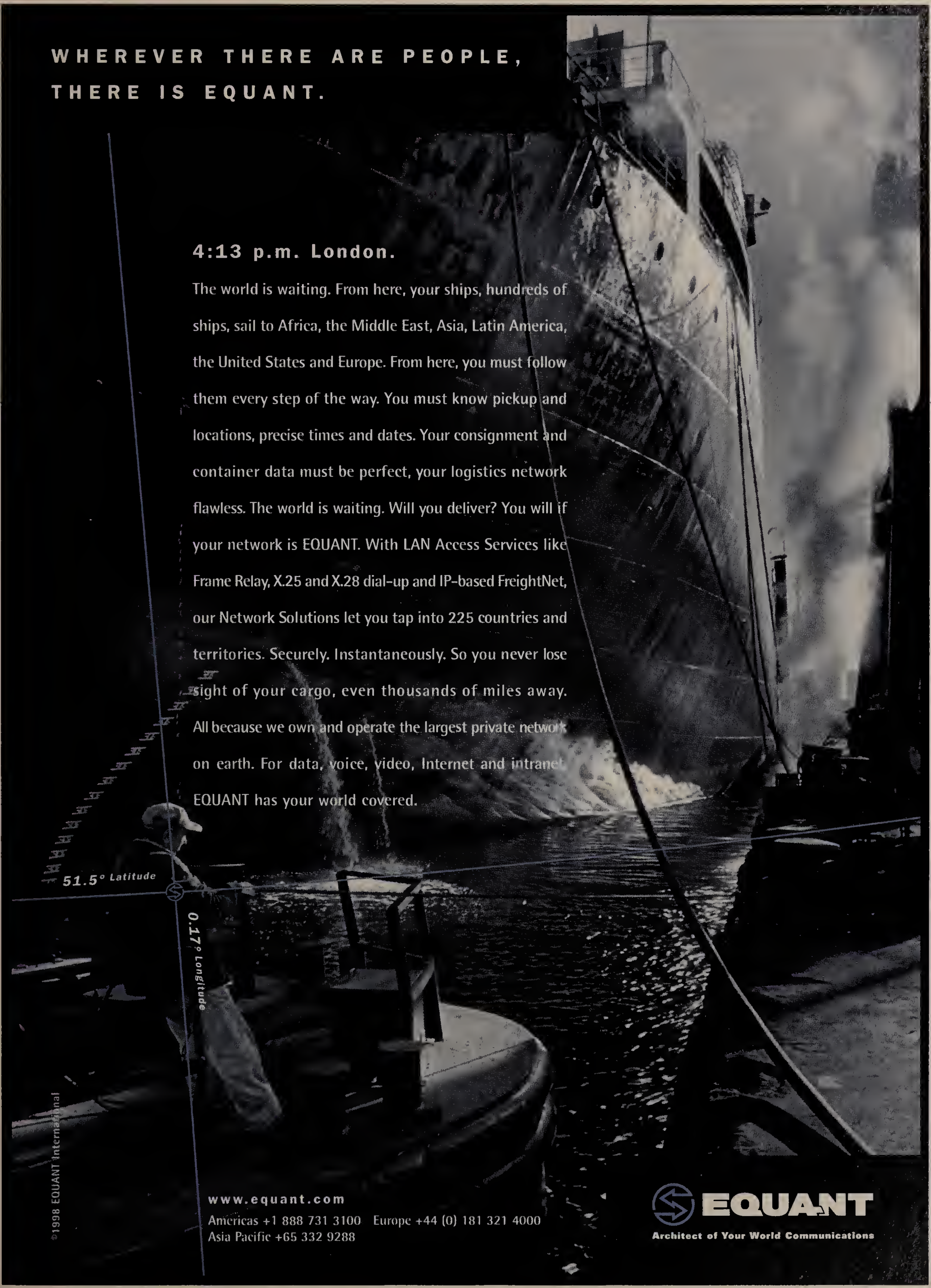
Frame relay's most compelling feature is its cost advantage — which can be dramatic, especially when compared to leased lines or switched ISDN. Three hours of 385 Kbps BRI (basic rate interconnect) ISDN might typically cost $2,160, versus $700 to $900 for a 385 Kbps frame relay link. And the cost advantages are even greater in those parts of the world where ISDN does not exist, such as Asia.

Compelling advantages of cost, availability and reliability — without the jitters — make frame relay a viable alternative for transmitting pictures.

"Interest in this leading edge technology is strong throughout Asia," says Tom Faustino, vice president of sales for Asia, for network equipment vendor ABL Canada, Inc., Montreal. "In many countries, ISDN is just not available whereas frame relay is." According to ABL, the only additional equipment customers need is a frame relay compatible video codec — preferably one that can support MPEG data compression and can operate at up to T-1/E-1 speeds.

The codec is important, agrees Dzubeck, "because all the things you need to assure good video quality — like no jitter, delay or dropped packets — are provided at the ends of the circuit. Compression is key, and so is how [the codec] actually buffers and manages, not the [data] frame, but the screen image itself. For example, how does the codec deal with changes in the image from [video] frame to frame?"

Another issue is how to mix frame relay with ATM. Most carriers and vendors support a direct connection between the two. A second option is to simply run frame relay across an ATM backbone. These integration strategies will only become richer as frame relay and ATM standards committees continue to work out their differences. ✳



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Can We Talk? You Bet!

By Bruce Hoard

VOICE OVER FRAME RELAY (VOFR)—the voice counterpart to packetized data — is an evolving niche technology that produces significant cost savings and simplified network operations for a specialized audience. Enhanced by standard voice compression techniques that reduce digital network traffic by 8-to-1, VOFR fits the bill for many medium to small users with intracompany and international voice requirements, and for some large users as well.

VOFR, though, is increasingly at the center of a growing debate over its place in the overall network scheme of things versus the upstart Voice over IP — Internet voice. There are those who believe that an uncertain standards path for VOFR may lead it to a collision with IP voice. Frame relay vendors, meanwhile, are working feverishly to resolve standards issues and keep VOFR on its growth track. VOFR vendors and users alike maintain that, in addition to its cost efficiency, VOFR is equal to the voice quality of toll services.

> *Voice over Frame Relay fits the bill for specialized applications like international and intracompany calls.*

JOE VANDERBOS

The major hardware component required for VOFR is the voice frame relay access device (FRAD), which generally costs between $4,500 and $30,000. Low-end FRADs typically create point-to-point links and offer no additional features. The more expensive models offer an array of network routing and management capabilities.

Voice FRADs create packetized frames of voice data for transmission over frame relay and other lines. Like the packet assemblers and dissassemblers used to package and interpret data frames, voice FRADs are required at each end of the frame relay link.

There are currently no dedicated VOFR service offerings from carriers, although there are rumblings about possible market entries that would offer high priority and low latency for VOFR traffic. VOFR users in the U.S. are usually charged one flat rate, nationwide. International rates vary. Frame relay services typically feature transmission speeds from 56 Kbps to 1.54 Mbps, and prices vary accordingly. Users must also pay access charges.

Network simplification is a significant advantage of VOFR. At a time when many users are seeking to consolidate their networking solutions, the elimina-

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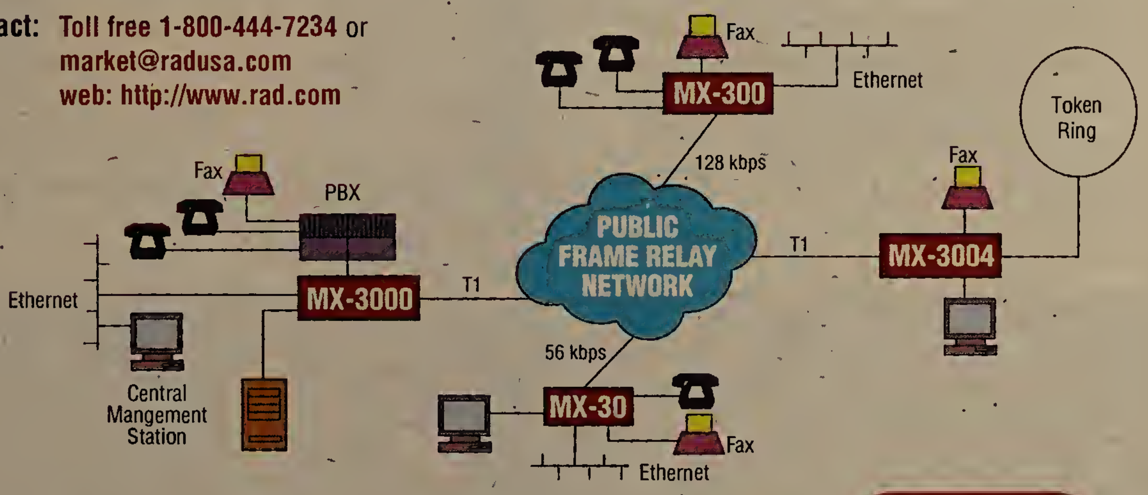

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tion of extraneous services and equipment has great appeal. For example, a branch bank, by implementing VOFR, could eliminate SDLC lines, binary synchronous communications lines, asynchronous communications lines, and LAN lines. Add in the accompanying cost savings, and VOFR looks very attractive.

CORPORATE CONNECTIONS BENEFIT

Steven Taylor, president of Distributed Network Associates, Greensboro, N.C., a network consulting company, claims VOFR makes the most sense today for controlled environments where all of the voice traffic can be considered to be “on-net.”

“Voice over Frame Relay is most easily justified for intracorporation communications between sites on the corporate enterprise network, using the same facilities that are already in place for the corporate data infrastructure,” he notes. “Similarly, it can be justified by a carrier who wishes to provide voice services for users connecting over its internal network.”

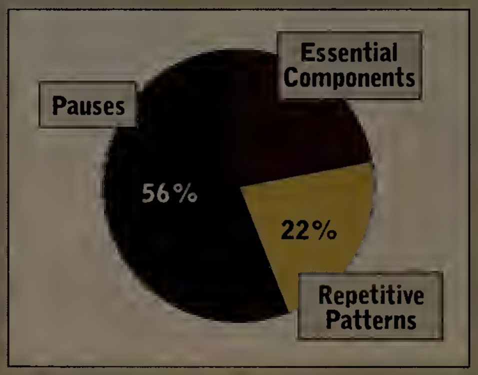
Frame relay vendors are working to resolve standards issues and keep VOFR on its growth track.

In the case of internal corporate traffic, users with unused frame relay bandwidth can benefit in two ways. First, they can make use of their extra bandwidth. Second, they can save money on toll calls by using that bandwidth to transmit VOFR.

Some day, according to Taylor, packet voice — be it over the Internet, frame relay or ATM — may become a reasonable alternative for “any-to-any” dialing, whether both parties are using the packet service or not. In this scenario, any of these three technologies could essentially provide the same functions as plain old telephone service.

Presently, however, he says VOFR is immediately applicable for the corporate infrastructure while the kinks are being ironed out of interoperability issues and strides are being made toward nearly universal connectivity.

Normal Speech Components



“Only 22% of normal speech needs to be sent for high-quality voice communications.”

Source: Frame Relay Forum

INTERNATIONAL APPEAL

VOFR technology is particularly attractive as a vehicle for smaller carriers to offer callback services from the U.S. to international locales. Travelers take advantage of the service by using a credit card or account number to dial a local number, which prompts a dial tone from either a switch in the U.S. or the country from which the call is being made. Calls made via these connections are then billed at a rate normally charged for U.S. toll calls.

Jim Chiu, president of Vertex, Los Angeles, uses VOFR technology to provide virtual private network connections to Asian customers via a network of dedicated leased lines from AT&T Corp., New York, N.Y., and Cable & Wireless Inc., Vienna, Va. The company currently uses 30 model S200 voice FRADs from Nuera Communications, San Diego, Calif., one of the approximately 15 vendors competing in the voice FRAD market.

Vertex pays $47,000 per month for low-bandwidth circuits, and $130,000 per month for a 1.54 Mbps T-1 circuit. That seems like a lot until Chiu describes the impact of 8-to-1 voice compression, which creates a multitude of circuits and a surfeit of savings on all his circuits. According to his calculations, Vertex saves roughly 20 cents on each minute of traffic, and, in the case of its Philippines routes, it uses about 800,000 minutes per month.

That creates a savings of approximately $160,000 per month over normal toll services.

Even with the expenses of implementing these foreign links, says Chiu, “We can break even in three months, including operations, and within a month for just the equipment alone. It’s really great, and the voice quality from Nuera is super.”

Stephen Pickett, vice president, information technology, Penske Corp., a diversified transportation services company based in Detroit, is in the process of implementing VOFR. Pickett says Penske, which will use voice FRADs

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Advantages of VOFR

- Cost savings
- Reduces digital network traffic by 8-to-1
- Network simplification
- Immediate availability

from Cisco Systems Inc., San Jose, Calif., expects to slash its monthly international telephone bill by between 20% and 30%. Penske will use EDS, Plano, Texas, as its service provider, and EDS will secure international circuits from AT&T and Infonet Services Corp., El Segundo, Calif., to carry voice over frame.

Despite his enthusiasm for international VOFR, however, Pickett says he would not utilize domestic VOFR because Penske is able to use its leverage with U.S. carriers to obtain very inexpensive rates and quality service.

FRF.11 is "the first step" toward true multivendor interoperability of voice and fax over frame relay.

Ed Koch, vice president of telecommunications, First Data Corp., a leading supplier of credit card processing services in Omaha, Neb., is another user who feels the quality and cost of his traditional toll services make them superior to VOFR. "We are ready to skip voice over frame and go to IP voice," Koch says.

HAMMERING OUT STANDARDS

Larry Greenstein, director of product management at Nuera Communications, and vice chair of the Frame Relay Forum, says the Frame Relay Forum may also be ready to forsake VOFR for Voice over IP as it is currently being developed by the Voice over IP Forum. This would be done to one unified packet-based voice standard.

"We want to align the Frame Relay Forum voice signaling procedures with the Voice over IP Forum's voice signaling procedures so the vendors don't have to implement it two different ways," Greenstein observes. "There's only one problem that we're trying to solve, and we can solve it regardless of whether it's over frame relay or IP. It is likely that the Frame Relay Forum will utilize the output of the Voice over IP Forum with regard to this issue."

Advantages of Voice over IP include the ability to terminate to specific IP addresses, and the availability of more advanced switching functionality.

While the future of standards gets hammered out, voice FRAD vendors—if not all users—will look to FRF.11 as their guiding standard. FRF.11 is an implementation agreement describing technical guidelines for VOFR communications. The Frame Relay Forum says it is "the first step" toward true multivendor interoperability of voice and fax over frame relay.

Not all users swear allegiance to FRF.11, though, because most of them have standardized internally on voice FRADs from a single vendor. As long as they remain single vendor shops, FRF.11 will not be a priority.

Voice over IP is not the only alternative to VOFR. Voice over ATM is also growing in popularity. According to a recent study from Communications Industry Researcher Inc., Charlottesville, Va., respondents said voice will grow from 7% of cell relay service revenues currently to 17% by 2000, making it the fastest growing segment of the cell relay services market

VOFR A THREAT TO CARRIERS?

Does VOFR pose a dilemma for voice-oriented carriers, who could end up competing against themselves to produce a service that threatens their flagship voice offerings?

"I certainly think so," says William Flanagan, vice president of technology at voice FRAD vendor FastComm, Sterling, Va. It's not going to happen overnight, but it probably won't take as long as it took to convert from analog central office switches to digital switches."

Rick Dardas, frame relay marketing manager with AT&T High Speed Services, says there are some applications that provide good "niches" for VOFR. "But getting into larger voice applications, we don't see any substantial threat."

Still, VOFR may not live to adulthood if the power of the Internet drives the widespread adoption of Voice over IP. Regardless of its future, however, VOFR is currently a very attractive technology for its target audience. Like so many of the other aspects and qualities of frame relay services, VOFR is definitely here and now. ✻

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Energizing Columbia's Network

Gas company turns to frame to better serve 7 million customers in 15 states.

By John Kirkley

FRAME RELAY USER PROFILE

THE COLUMBIA ENERGY GROUP has a new name, an expanded mission and a new approach to networking. The Reston, Va.-based company, with $6 billion in assets, changed its name from The Columbia Gas System in January 1998. Its operating companies are engaged in all phases of the natural gas business, plus marketing, fuel management services and electric power generation, and sales and trading. They serve more than 7 million customers in 15 states and the District of Columbia. A high-speed, highly integrated network is essential. That network, based on frame relay and ATM, is now becoming a reality. In the process, quite a few hurdles had to be overcome.

When telecommunications expert Mike Kaltenbaugh joined the company in 1996, he faced "a tower of Babel." Scattered throughout the operating companies were incompatible LANs, operating systems and applications, and a network that mixed private lines, microwave and nailed-up circuits from different telecommunications providers.

"We have a highly mobile and dispersed workforce. We were determined to treat communications as the fabric that knit the corporation together," Kaltenbaugh says.

The result was the creation of Enterprise Multimedia Communications (EMC), which Kaltenbaugh directs. The EMC is a single organization responsible for all voice, video, data, and wireless communications. "We're not part of Information Services — in fact, IS is one of our best customers. They take care of the mainframes and the server farms. We handle all data downstream of the channel interface and upstream from the network interface card. On the voice side, we're responsible from the handset upstream through the PBX and beyond."

Like every regulated utility, "our company has to do more with less. But our employees need access to communications services anywhere they are. This influenced our decision to move from private to public networks and build an architecture that is flexible and scalable to meet the company's changing business needs," he says.

Part of the solution was to use a single provider, AT&T Corp., New York, N.Y., for both voice and data. The network is configured using frame relay feeding into an ATM backbone. Traffic moves between 214 nodes, located all over the country, and across the backbone, which connects sites in Louisiana, Alabama, Kansas, and Washington, D.C.

"We began implementing frame relay in October 1996 and we're about 98% done. The ATM is going up now," Kaltenbaugh says.

Columbia Energy Group

"We've found that frame relay is scalable, flexible and more cost-effective than our previous technologies," he continued. "You can't beat it for reliability. Once we get a frame relay circuit turned on, we forget about it. Plus, I now have tools that allow me to monitor both the ATM and frame relay services in realtime. I don't manage the network, I manage the provider. And AT&T is committed to meet or exceed our expectations."

Kaltenbaugh adds that a major factor in making the new network architecture a success was aligning the technology with the business goals. "Business drives the technology," he says, "not the other way around." *

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Seven Deadly Sins

Knowing which pitfalls and common mistakes to avoid will be key to a successful frame relay network implementation.

By [illegible]

EVEN THOUGH it was four years ago, Frank Henderson, chief technology officer at the NetPlex Group Inc., a consultancy in McLean, Va., remembers the meeting well. He was talking to a frame relay provider preparing the rollout of its frame relay network, and he asked how the company planned to manage the network. "We'll roll it out first, and then figure out how to manage it," the provider replied. An astonished Henderson says now, "That's the exact opposite of the advice I give to network managers."

Advance preparation, as Henderson points out, is key to a successful frame relay network implementation. One way to lay the groundwork for this process is by knowing in advance which pitfalls to avoid. When it comes to the task of selecting a frame relay provider, the following are the most common mistakes network managers make.

MISTAKE ❶ NOT DOING ENOUGH HOMEWORK

ONE OF THE MOST WIDESPREAD errors is not doing enough homework upfront in determining the frame relay network's needs. "You can go blind from frustration if you don't know what you want and what you require," says industry analyst Frank Dzubeck, president of Communications Network Architects Inc., Washington, D.C.

Where to begin? According to Dzubeck, the first thing to determine is your bandwidth and delivery expectations. What is the information rate on a per site basis, and what are the central site needs on an aggregate basis? This data is important for determining the committed information rate (CIR).

Another thing to consider is the geographic scope

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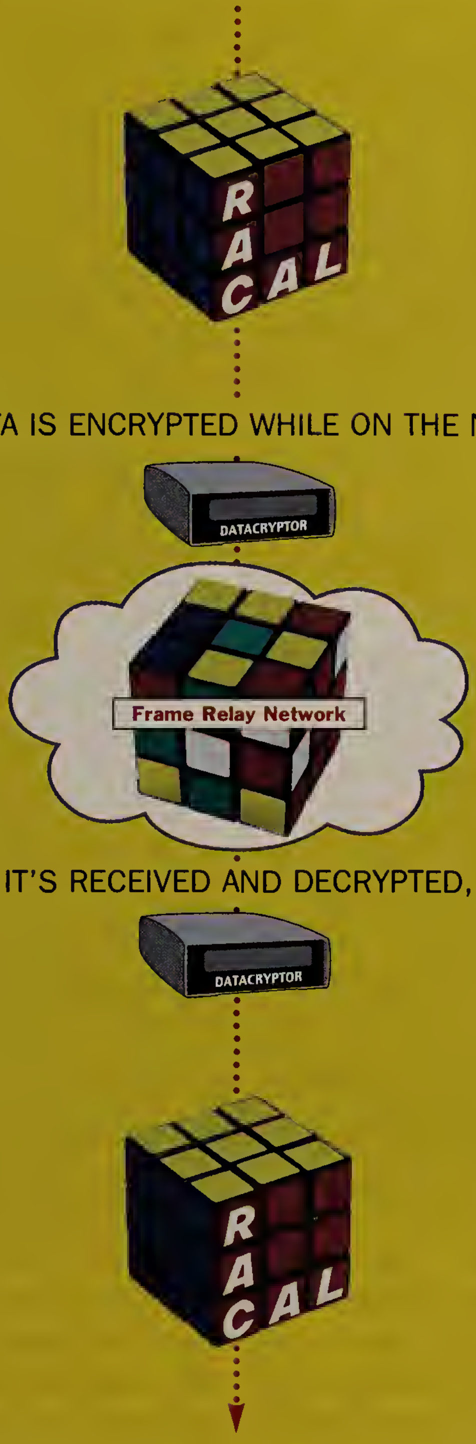

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of the network and the distribution of traffic locations and the traffic patterns. This will eliminate carriers that don't provide coverage in those areas. If you need an international carrier, find out where their access points are located and what their tariffs are from different ports. "What if you have a site in the Mojave desert, and the nearest access point is Los Angeles?" Dzubeck points out. "That could make the service very expensive."

If the network is contained within a specific region, there may be some cost savings in using a regional frame relay provider. "Regional carriers may have more switches concentrated in an area, which, when coupled with their proximity, may make them cheaper," explains Cathy Gadecki, a broadband senior consultant, TeleChoice Inc., Verona, N.J. However, she does caution that some regional companies may be limited in their offerings. (See Mistake #3.)

Finally, you should decide how much of the network management you want to outsource. Managed network services (MNS), where the carrier helps manage and maintain the network, are currently used by 30% to 40% of carrier customers, according to Gadecki, and allow network managers to reduce network staffing and training.

Outsourcing, however, reduces the amount of control you have. "It can be like the fox guarding the chicken house," says Dave Koehler, network technologies director at NetPlex.

MISTAKE ❷

BEING SPOOKED BY "STAGE FRIGHT"

IF THE AMOUNT OF HOMEWORK above seems intimidating, Gadecki's recommendation is to "relax." She says many network managers make the mistake of becoming immobilized with fear. "They start doing their homework and become nervous about little things," she explains. As a result, "they end up dragging their feet," delaying, or even postponing the deployment of the frame relay network. Gadecki recommends that you "lean on" the carriers for help in researching your network's needs, and don't be afraid to use resources like MNS.

MISTAKE ❸

NOT EXPLORING THE PROVIDER'S NETWORK AND CAPABILITIES

IT IS ALSO IMPORTANT TO do due diligence on the carrier's own network and capabilities. For example, what is the reliability of the network?

Mark Wheeler, a senior network engineer at Mentor Graphics, an electronic design automation (EDA) hardware and software company outside of Portland, Ore., learned the importance of a carrier's reliability when he was involved with the installation of a frame relay network in Europe. Despite the fact that the network provider was a large international, the network still suffered from power outages and local loop problems. Wheeler advises against depending on the carrier's sales or data representatives for information about their network. Instead, he recommends finding out if the carrier has written any white papers describing the network.

Buyer Beware

DO YOUR HOMEWORK. Determine network and outsourcing needs upfront.

CONTROL STAGE FRIGHT. Use the resources of your carrier and MNS to avoid getting overwhelmed by research details.

DO A THOROUGH DUE DILIGENCE on your potential carrier's own network and capabilities.

NEGOTIATE YOUR CONTRACT, based on the number of ports, port speed, the number of permanent virtual circuits (PVCs), and the CIR; also factor in reports and service level agreements (SLAs).

EVALUATE CUSTOMER SERVICE and technical support.

MAP YOUR COMPANY'S business requirements into the SLA.

LOOK AHEAD TO future needs, but don't buy unnecessary capabilities.

MISTAKE ❹

PAYING STICKER PRICE

ONE OF THE BIGGEST OMISSIONS NetPlex's Koehler says he sees network managers make, is neglecting to negotiate their contract with the frame relay service provider. "It's like walking onto a car lot and paying full sticker price instead of haggling," he says.

To negotiate successfully, it is important to understand pricing is not determined by distance or usage, but instead depends on factors such as the num-

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ber of ports, port speed, the number of permanent virtual circuits (PVCs), and the CIR, explains Mark Kaplan, chair of the North American Market Development and Education Committee at the Frame Relay Forum. Regarding the latter, Kaplan suggests asking the carrier if they offer asymmetric pricing — where there may be one CIR for one direction, but a lower CIR in the other direction, resulting in substantial cost savings.

Other areas that should be negotiated include:

The format, frequency, granularity, and cost of reports. Wheeler says he finds graphics to be most helpful in showing him the value of the service by showing bursting over the CIR. CNA's Dzubeck suggests that the reports include information by site, location and transmission pair, as well as usage of equipment, length of transmission and time of day.

As for the pricing of the reports, NetPlex's Koehler says he has seen it vary from "hundreds to thousands of dollars per month," depending on the kind of reports and the size of network. As Koehler points out, "This is a monthly charge that won't go away, so try to negotiate a good rate."

Service level agreements (SLAs) can also be negotiated. Joe McCoy, director of network systems management at NetPlex, suggests asking the carrier to furnish a copy of their standard SLA. "They typically don't like to do this because it puts them up to scrutiny," he says. "But the standards of SLAs are open to negotiation."

Items that should be covered in the agreement include response time, frames sent/frames received, how the system will be monitored, and what is covered under network availability (i.e., is it end-to-end or point-of-presence to point-of-presence?). Make sure the carrier puts down in writing what happens when the terms of the contract are not met. TeleChoice's Gadecki says the SLA should be "a simple, clean service agreement where the carrier has enough confidence to give you a meaningful guarantee."

MISTAKE ❺
NOT RESEARCHING POST SALES SUPPORT

It's rare that a network manager doesn't require some hand-holding during implementation of the frame relay network, so make sure the person holding your hand is knowledgeable and dependable.

Mentor Graphics' Wheeler found his carrier's support to be invaluable when setting up the European network. "The carrier's local representative and technical support group were key to getting the network up and running," he explains.

How do you evaluate the support staff? Ask the carrier to introduce you to them. Do you feel comfortable with them? Are they well trained? Ask for references from other customers. Wheeler also recommends finding out what the carrier's commitment is in terms of support — as a rule, he says, the carrier should provide access to the support team for 60 to 90 days during the network implementation.

MISTAKE ❻
NOT TAKING INTO ACCOUNT THE "BUSINESS" OF YOUR COMPANY

McCoy and Koehler agree that a critical mistake network managers make is not taking into account the company's end users and senior management. "If the network manager doesn't map their company's business requirements into the SLA, it becomes a worthless piece of paper," Koehler claims.

McCoy adds, "If frame relay networks are to be successful, then input is needed from the senior business partners and the frame relay service carriers." Some questions that should be addressed include: Which applications are important to the business? What is the end users' expectations of the network's performance? Does the IT department have the resources and time needed to meet these needs? The important thing to remember is to keep the lines of communication open between all parties. "The wall between network managers and application developers has to come down," Koehler cautions, "if the frame relay network is going to meet the service level and throughput needs."

MISTAKE ❼
NOT LOOKING AHEAD

Finally, you should consider future needs when looking at frame relay carriers. Some things to consider, says Kaplan, are if the network offers ATM, and if frame relay and ATM are integrated on the same network. He also recommends looking at remote locations that might be hooked up in the future.

Dzubeck, however, cautions against buying capabilities that aren't yet needed. "Beware of salesmen offering free bandwidth — nothing is ever free!"

Knowing which mistakes to avoid, exploring your current needs, and researching the providers can help greatly in the frame relay carrier selection process. Armed with this knowledge, you can look for the carrier that, in Gadecki's words, "gives you the best business value." ✳

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Reynolds Wraps Remote Sites With Frame Relay

By John Kirkley

Frame relay helps cut networking costs and simplifies management of worldwide networks.

FRAME RELAY USER PROFILE

A LITTLE OVER 50 years ago the World Series was televised for the first time, *A Streetcar Named Desire* debuted on Broadway and, in a Richmond, Va., department store, Reynolds Wrap household aluminum foil made its first public appearance.

Like the game and the play, Reynolds Wrap is still around and doing nicely. In the 50 years since the product's introduction, its creator, the Reynolds Metals Company, headquartered in Richmond, Va., has evolved into a fully integrated manufacturer, distributor and marketer of fabricated aluminum products, and a wide range of plastic products for the consumer and building products markets.

Reynolds growth and its widespread operations have spurred corresponding growth in the company's data networks. Frame relay is playing a major role in connecting Reynolds Metals' sites located around the world.

"Sites are located all over the United States and in Hawaii, Puerto Rico, South America, and Canada," says Debbie Shashaty, lead communications consultant, Reynolds data communications group, a part of Information Technology. "We have a campus WAN between three buildings in the Richmond area and 120 remote sites; 98 of the remote sites are using frame relay."

Frame relay has proven to be a flexible and reliable technology that complements Reynolds' client/server IT environment.

Reynolds began making the shift to frame relay in 1994. The reason? "Cost," says Shashaty emphatically. Previously, data traveled over private lines using X.25 in Canada, and dedicated lines and point-to-point linking in other worldwide locations — an expensive but unavoidable solution at the time. Now, frame relay technology has allowed the company to cut its networking costs significantly.

"Cost may have been our primary motivation," Shashaty adds, "but frame relay has a lot of other advantages as well. With frame it's a lot easier to add sites. All we have to do is reconfigure a router and we're in business."

In addition, Shashaty says that network management has been simplified. Her group is using software products from Visual Networks, Rockville, Md., which, she says, provide a high degree of visibility into the network and let them track their service level agreement (SLA) of 99.5% network availability. Network vendors include AT&T Corp., New York, N.Y., and MCI Communi-

(Continued on page 38)

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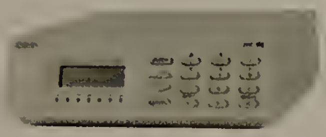

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Switched Virtual Circuits Bring Bandwidth Bargains

A LOT OF SMART network managers have already bought into public frame relay services as a cost savings over dedicated lines. Now a further refinement to frame relay promises the potential of more savings and the opportunity to link smaller corporate sites into the enterprise: switched virtual circuits (SVCs). The potential of SVCs, however, must be balanced with a new diligence from network managers to ensure that the services they buy are best suited to the traffic that needs to be sent.

SVCs allow customers to buy just the bandwidth they need.

Part of the beauty of frame relay is that it simplifies the tangle of dedicated circuits a corporate network must support in order to fully mesh each site with every other site. In a fully meshed dedicated network, every location receives multiple lines, each line representing an actual physical circuit to some place else. The circuit is available all the time, whether it is being used or not.

In a frame relay network, that snarl of wires at every location is replaced by a single physical line carrying multiple virtual circuits. Each virtual circuit is a logical connection to another site that is maintained by the frame relay switch.

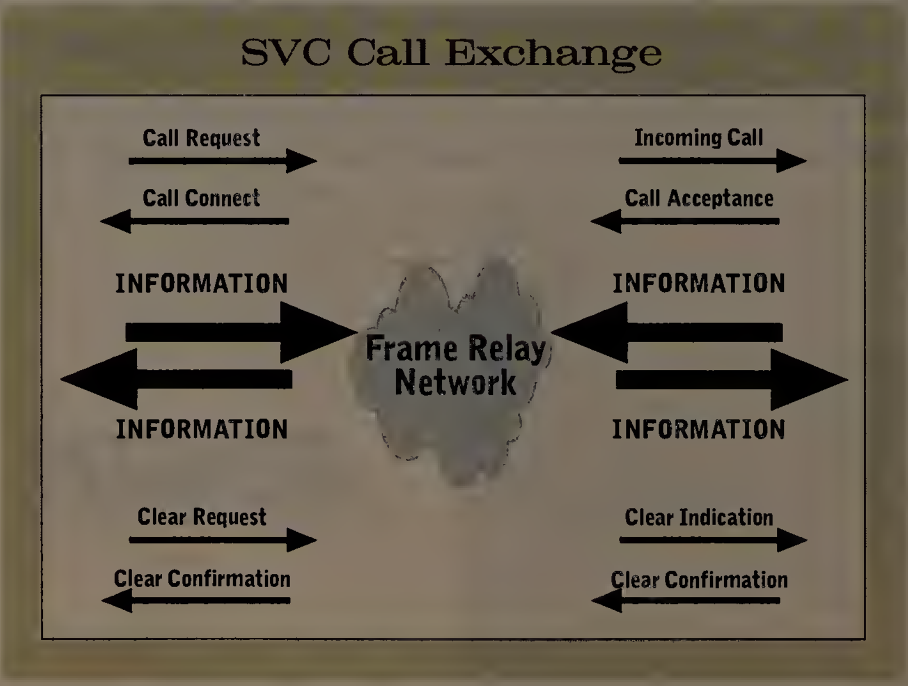
With careful tuning, a network manager can adjust the size of each virtual circuit so it provides just enough bandwidth for the maximum traffic it must handle.

PVCs VERSUS SVCs

Today, most of the virtual circuits in use are permanent virtual circuits (PVCs). That is, they are provisioned in the frame relay switch to provide a specified minimum bandwidth all the time.

In contrast, the emerging *switched* virtual circuit is set up only when it is needed, and then torn down. The potential of SVCs is that customers can buy just the bandwidth they need, and service providers can gain even more efficiency in how they expend switching resources.

In a perfect world, frame relay customers would all want fully meshed PVC networks to achieve top performance, according to Tom Jenkins, a broadband analyst with TeleChoice Inc., a consultancy in Verona, N.J. SVCs, he says, introduce delay. They require time because setting up calls involves signaling back and forth



The exchange that takes place between the frame relay network and the user during an SVC call.

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from the end points of a circuit and among all the switches in between, before the bandwidth can be used. But since it is not a perfect world, and frame relay customers work within budgets, some delay may be acceptable, Jenkins says.

When the cost-delay tradeoff makes sense, SVCs offer customers much greater flexibility than PVCs, according to Lori Dreher, president of the Frame Relay Forum. For example, a small site on a network might not generate or receive enough traffic to warrant PVCs to all the other sites. It might get by with just a single PVC to a large central site, Dreher says. But with SVCs that are priced right, that could change. "SVCs can give you the flexibility to reach lots of end points from one remote office. You can bring up and take down lots of VCs for lots of destinations," Dreher says.

And it could be easier to order an SVC service. Rather than sizing and mapping into a switch all the logical connections for a PVC network, the customer would buy a single SVC for each site. All the logical connections would be made on-the-fly as they were requested, says Dreher.

> **Customers will have to crunch the numbers to see whether SVCs, PVCs or a mix makes the most sense.**

In another scenario, a customer might have a constant need for a 28 Kbps virtual circuit between sites. But occasionally, that traffic might burst significantly above 28 Kbps for prolonged periods. During that peak load an SVC large enough to handle the heavier traffic might be brought up.

There are also potential cost savings with SVCs, Dreher said, because the virtual circuit is not up 24 hours a day. Any savings, however, will depend on how much carriers actually charge for PVCs.

Today, MCI Communications Corp., Washington, D.C., is the only carrier currently promising to offer frame relay SVCs. So, it is still unclear what pricing schemes will evolve. One option is for the carrier to charge a flat fee per site for an SVC service, depending on maximum bandwidth.

Other options could come into play, Jenkins said. For example, when a customer sets up an SVC, a certain amount of bandwidth is requested. Will the carrier allow the SVC to accept traffic bursts above that bandwidth if the need arises, or will it throw frames away? How much will the carrier charge to allow that bursting? "There are going to be a lot of pricing structures out there," Jenkins says.

That means customers will have to crunch the numbers to find out whether SVCs, PVCs or a mix of the two makes the most sense. One way to properly size a mixed PVC/SVC network would be to order SVCs for each new connection, and monitor actual use for several months. The network manager could then decide whether to make the connection a PVC or maintain it as an SVC. That manager could then review use on all circuits quarterly to adjust them.

HURDLES AHEAD

While standards for SVCs have been around for years, carriers have not done much with them. One reason has been a lack of customer interest. "We haven't seen any demand for SVCs, which is not to say we will never do them," says Michael Kelley, frame relay product manager for service provider Intermedia Communications Inc., Tampa, Fla.

Another issue for carriers will be migrating from the fixed-rate billing that is currently used for PVCs to a usage-based billing plan for SVCs, Kelley says. Usage billing software would have to be developed.

Carriers will also have difficulty sizing their networks for SVCs, TeleChoice's Jenkins says. Customers will buy physical ports of a certain speed, but the carrier will have no way to gauge how much of that port will be used or how often. With PVCs, customers order a minimum bandwidth, which can be interpreted as the amount they will actually use.

SVCs provide logical network connections on an as-needed basis through the frame relay network, similar to direct dialing on the telephone network. SVCs give frame relay the fast, flexible option of reaching anyone on the network anytime.

On the flip side, because the frame relay switches would be used more efficiently with SVCs, carriers would have to add fewer switches as they add SVCs than they would if they were adding PVCs, Dreher said.

With all the variables, there is no clear winner between PVCs and SVCs. It all depends on the characteristics of the network. Says Jenkins, "Customers are going to have a lot of decisions to make with SVCs if they are smart." ✻

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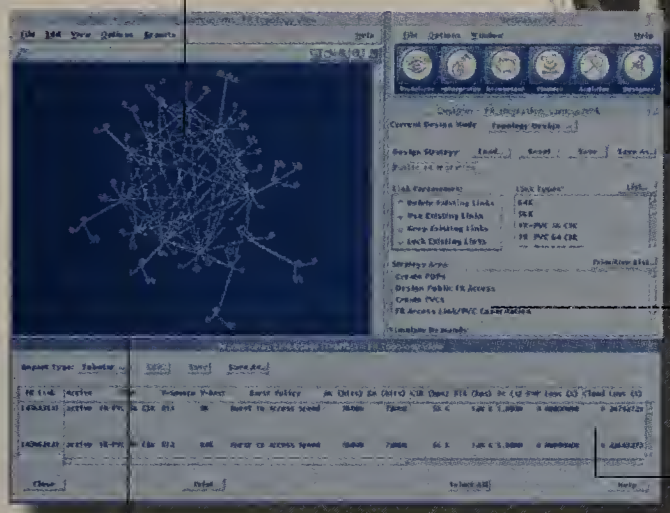

Redesign of a private line network to public Frame Relay

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Performance results from Frame Relay cloud model

LANs, routers, private lines, FR access links, FR PoPs and PVC's show utilization with color coding

You can evaluate the impact on network cost and application performance of migrating from private line to public Frame Relay as well as identify optimal designs for both pure and hybrid networks. Users of existing Frame Relay networks can create capacity planning strategies as new sites and applications are implemented, including identifying which routers to use for backbone connectivity and which are better as customer premise concentrators.

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Virtual Private Networks

Turning to Frame

By Howard Millman

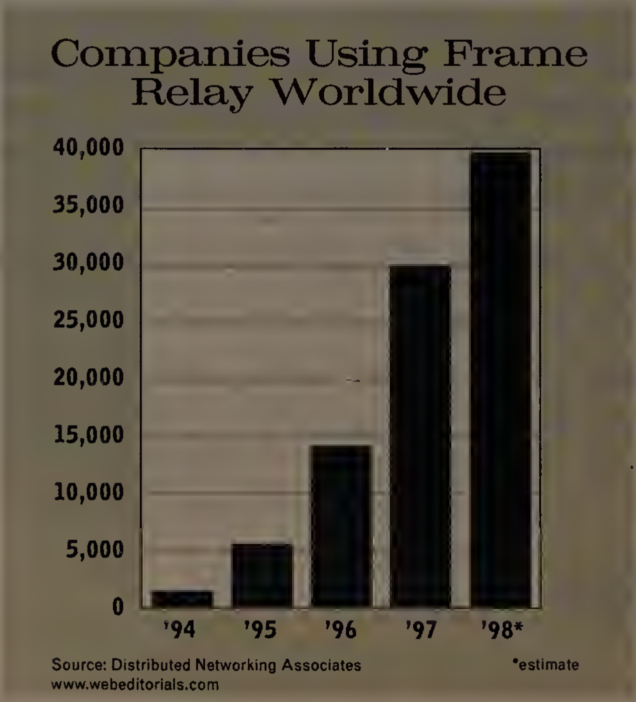
Frame relay delivers support for efficient and secure VPNs without the cost of expensive dedicated leased lines.

FRAME RELAY's superior ability to carry voice plus mixed data types makes it the technology of choice for companies migrating from a host-based to a decentralized computing model for their virtual private networks (VPNs).

What makes this packet networking technology suitable as a transport mechanism for VPNs? Low cost, certainly. VPNs running on a frame relay architecture make it possible for network administrators to replace costly dedicated leased lines and to exchange data economically using the public Internet.

Used as a VPN, frame relay's acknowledged strengths include bandwidth-on-demand, virtual circuits for any-to-any connectivity on a per call basis, and handling of variable data rates to support high-speed communication.

Companies Using Frame Relay Worldwide



Source: Distributed Networking Associates www.webeditorials.com

*estimate

Likewise, frame's inherent burst traffic management ability and buffering make optimum use of available bandwidth and negate the need for extensive protocol processing and related services.

Frame relay can create an Internet-based VPN on almost any existing system through the use of tunneling, a technique that uses encryption and authentication technologies. And because frame relay's intelligence is applied at the customer's premises, it can move low error-rate data (significantly more accurate than analog) safely and securely over fiber optic, ASDL (Asymmetrical Digital Subscriber Loop), ISDN, and even POTS dial-up lines. By performing all the data encoding and decoding at the end points, the on-premises PCs and servers, administrators can achieve a high degree of data security and integrity. For added security, administrators can overlay user authentication.

Another factor driving the success of frame relay as a transport for VPNs is its ability to interoperate with ISDN and ATM networks. As a worldwide standard, voice and binary data can readily bridge frame relay services provided by different network carriers. As a result, subscribing companies have fewer worries about scaling their VPNs to global coverage when they need to.

That is why major carriers and ISPs have created frame relay networks that extend from Chile to Siberia.

If your key concern is to implement a cost-effective, high-availability and secure VPN, look to frame relay, a worldwide communication architecture, for today and years to come. ✻

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Myths vs. Realities

By John Kirkley

Frame relay has earned its stripes on the basis of being a highly reliable, economical, easy-to-install, and easy to manage technology, according to network managers. Because of its relatively low profile, though, some misconceptions about frame relay have been floating around. For example, one of the prevalent myths is that it will be sent packing by that big, new kid on the block — ATM.

> *While other technologies grab the headlines, frame relay has worked its way into the heart of the enterprise network.*

No so, says Mark Kaplan, chair, North American Market Development, Frame Relay Forum, and senior product marketing manager, Newbridge Networks, Inc., Herndon, Va. "The two technologies will coexist," he asserts. "Frame relay is the traffic driver — it provides access to the ATM network."

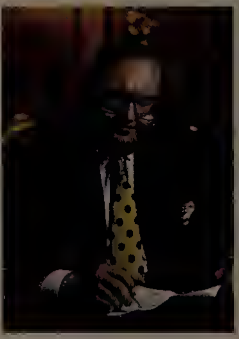
Frank Dzubeck, president of Washington, D.C.-based Communications Network Architects, agrees. "ATM is a backbone architecture and does not impact frame relay. The issue is one of speed — frame relay does not run at 155 Mbps. In fact, it's tough to get it up to 45 Mbps. But for low-speed multidrop, it's perfect. Frame relay is an easy, well-defined, conservative way to go."

Not only do ATM and frame relay coexist, but their interaction is becoming even stronger due to an industry-wide agreement being worked on by the Frame Relay Forum and the ATM Forum. The agreement covers "network internetworking," which allows frame relay transport from end-to-end through the ATM cloud, and "service internetworking," which supports frame relay at one end of the connection and ATM at the other.

"If you have huge bandwidth requirements or you're a service provider that needs a core technology, use ATM," says Jeff Phillips, a broadband consultant with TeleChoice Inc., Verona, N.J. But for a variety of other applications, cost and capability make frame relay far more attractive. One of the reasons for frame relay's continuing longevity, says Phillips, is that frame relay has adapted to the market and is able to offer capabilities still being promised by ATM — like voice and fax over frame, and the ability to support a mix of protocols.

That adaptability dispels another myth — that frame relay is only used for data transport. Phillips says that frame relay tied into an SNA network makes a good pipe for video or voice. There's no need to wait, he says; the technology is available today.

Dzubeck deflates yet another misconception about frame relay: "Because of its wide acceptance, people think that frame relay is available everywhere. That's not true."



Frank Dzubeck

Despite this and a few other shortcomings, it appears that frame relay will be around for some time to come, working harmoniously with ATM and other technologies well into the 21st century. ✳

1998 Seminar Dates and Locations:

April 15	Boston, MA
April 16	New York, NY
April 28	Irvine, CA
April 29	San Francisco, CA
May 13	Houston, TX
May 14	Atlanta, GA
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June 24	Washington, DC
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Frame Relay '98 will help you make sense of all that frame relay has become. This information-packed seminar, taught by Jeff Phillips, a frame relay expert with TeleChoice, Inc., addresses the technology from virtually every angle. In this seminar, we will explore everything from frame relay implementation fundamentals to application specifics and the many areas in between. Hot topics such as network management, voice and SNA transport, carrier and equipment vendor offerings, and interoperability will be covered in this powerful one-day session. New features and services available on the market along with their networking benefits will be addressed along with enhancements coming from industry players in the future.

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People Are Talking

By Howard Millman

Network managers, customers and analysts agree: Frame relay's solid technological core reduces the cost and complexity of communications services without compromising throughput performance or reliability.

Here's what they have to say in response to commonly raised questions and issues.

Why have so many carriers and corporations adopted frame relay?

"We chose frame relay because it allows us the flexibility to provide links between companies as they become necessary, without adding additional physical connectivity. This solves the 'meshed network' problem of 'who talks to whom.' We use frame for our international connections. The basic reasoning is the relative ease of obtaining service."

—Ed Koch, vice president, telecommunications, First Data Corp., Omaha, Neb.

"Corporations are comfortable with frame relay. It is the safe choice. Corporations have millions of dollars riding on their networks. They can't afford to take risks. They need a technology that has matured, one that is proven; that is frame relay."

—Frank Dzubeck, president, Communications Network Architects Inc., Washington, D.C.

"Carriers are comfortable with Layer One and Layer Two technology. Frame relay is the best of that category. It is an inexpensive, reliable and well-known standard. Carriers and corporations trust it. Until now, frame relay has been used most extensively for the long distance backbone. Now, we are seeing a change. You will find more and more corporations connecting to their carrier via frame relay, while other technologies form the backbone."

—Jennifer Pigg, vice president, data communications, Yankee Group, Boston

Why has frame relay become a de facto standard for virtual private networks?

"Frame relay is the cost-effective WAN solution that allows corporations to maximize the costs of expensive digital leased T-1 and T-3 lines. This flexibility and manageability have allowed corporations to build networks that meet their intersite connection requirements."

—Dave Koehler, network technologies director, The NetPlex Group Inc., MacLean, Va.

"Frame relay provides a good option for encouraging more central site data traffic, without the need for the telephone companies to add a significant

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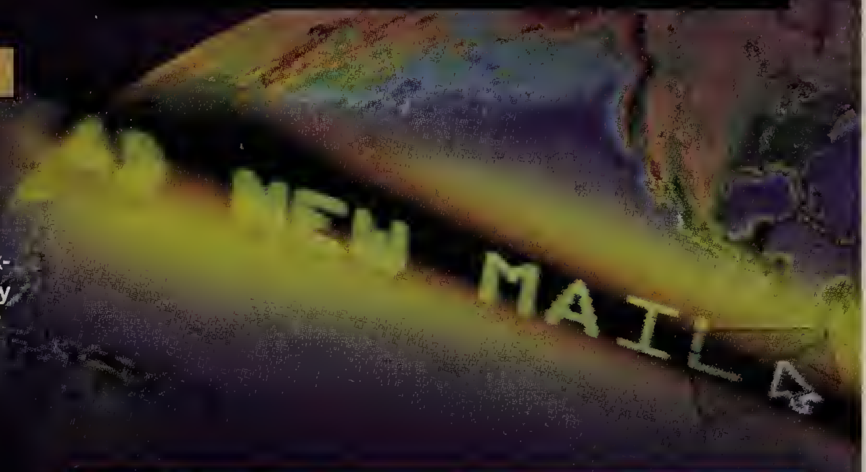

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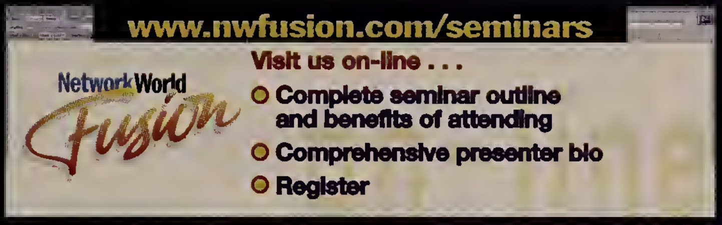
5. Use Internet e-mail and directories to support electronic commerce and business-to-business communication
6. Learn what messaging, directories, and groupware should cost and how to project/assess your costs
7. Follow best practices for messaging deployment, management, administration and help desk



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amount of equipment. The primary reasons for its widespread use are price, quality of service and its ability to bypass the telephone company's existing circuit-switched infrastructure."

—Hank Allard, principal, Edge Media, Leominster, Mass.

"Frame relay, especially when used as a low-cost connection technology to your Internet service, is a new and growing phenomenon. This is due to lower local tariffs because of the short distances involved. An even newer phenomena are VPNs, which allow secure network data to ride safely over the Internet and then go through your company's firewall onto your corporate network. What we have is a powerful convergence of two technologies."

—Michael Howard, president, Infonetics Research, Inc., San Jose, Calif.

What about the future of frame relay?

"First came private lines and point-to-point links, which still continue to grow at a respectable pace to augment existing networks. Second came frame relay and logical connectivity; now a very comfortable choice for network managers. Frame relay uses the underlying capabilities of existing networks. Now, looming on the horizon, are IP services, especially VPNs for the corporate WAN.

"With VPNs, managers can add intelligence to their network. In a few years, buying decisions will no longer be about the price/performance ratio of the logical connections, but of the price/performance of intelligence added by VPNs. However, since VPNs are brand new and missing much of their potential functionality, they need another three to five years until this new buying environment begins to exist."

—Cathy Gadecki, broadband senior consultant, TeleChoice Inc., Verona, N.J.

"Frame relay is a lower-cost, circuit-like version of leased lines. As such, it's easy for users to plan for its implementation. Today, frame relay is the only visible value-added network technology for carrying data. Since LANs are the source of all new demands for applications, and since LANs are data-oriented, frame relay is suitable for new applications, and will continue to play a role in their support."

—Tom Nolle, independent consultant and president, CIMI Corp., Voorhees, N.J.

How well does frame relay work with emerging technologies?

"The evolution of frame relay, allowing it to support voice and video, relates directly to its price-based penetration of the marketplace. That these non-frame-based signals can be modified to operate over frame relay is a genuine credit to the engineers."

—John Curtis, senior engineer/analyst, The Tolly Group, Manasquan, N.J.

"In time, people will buy IP services. They will make their logical choice. They will not even be aware of the service's underlying technology. In setting up their VPNs, they will probably be using frame relay and not even realize it. The technology will be that transparent."

— Frank Dzubeck, president, Communications Network Architects Inc., Washington, D.C.

Reynolds Metals Company

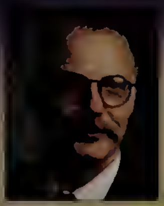
continued from page 26

cations Inc., Washington, D.C.

Frame relay has proven to be a flexible and reliable technology that complements Reynolds' client/server IT environment, which includes a large IBM mainframe, and several AS/400s and RS/6000 AIX-based workstations.

When it comes to ATM and other emerging network technologies, Shashaty is interested but, at the same time, very happy with frame relay. "Frame is working for us," she says, "and we're hearing that the technology will continue to improve. If it goes higher than T-1, we would definitely consider staying with frame relay. Right now, most of our ports are 65 Kbps, although we have some ports at higher speeds. And, like everybody else, we're using permanent virtual circuits [PVCs]. With higher line speeds and switched virtual circuits [SVCs], which provide frame on demand, we will be able to cut costs even more and meet our user's increasing bandwidth requirements."

At Reynolds Metals, frame relay, like Reynolds Wrap, seems to have a long future ahead of it. ✻



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Whether you need a firm understanding of networking technologies and applications or require a comprehensive update of current trends, this invaluable seminar will meet your needs. Packed with insights, Essentials of Networking and Data Communications is both informative and entertaining. This two-day seminar is developed and directed by Ray Horak, an internationally acclaimed network consultant, author and lecturer. As well, interactive case studies are incorporated into the seminar in order to illustrate the meaningful application of the critical technologies presented.

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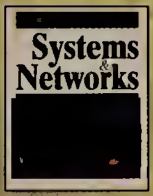

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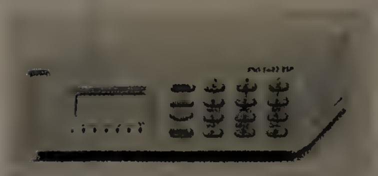

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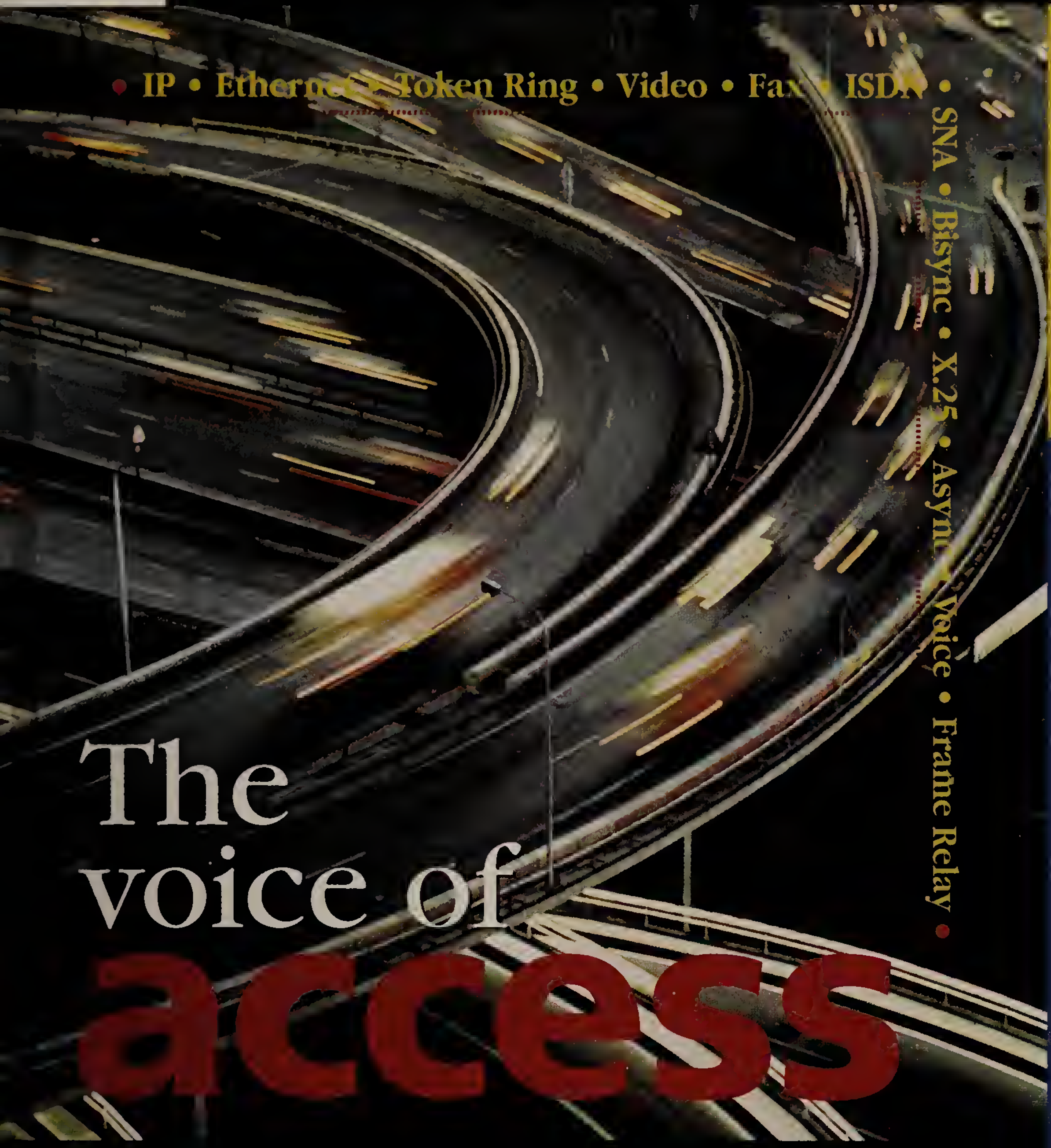
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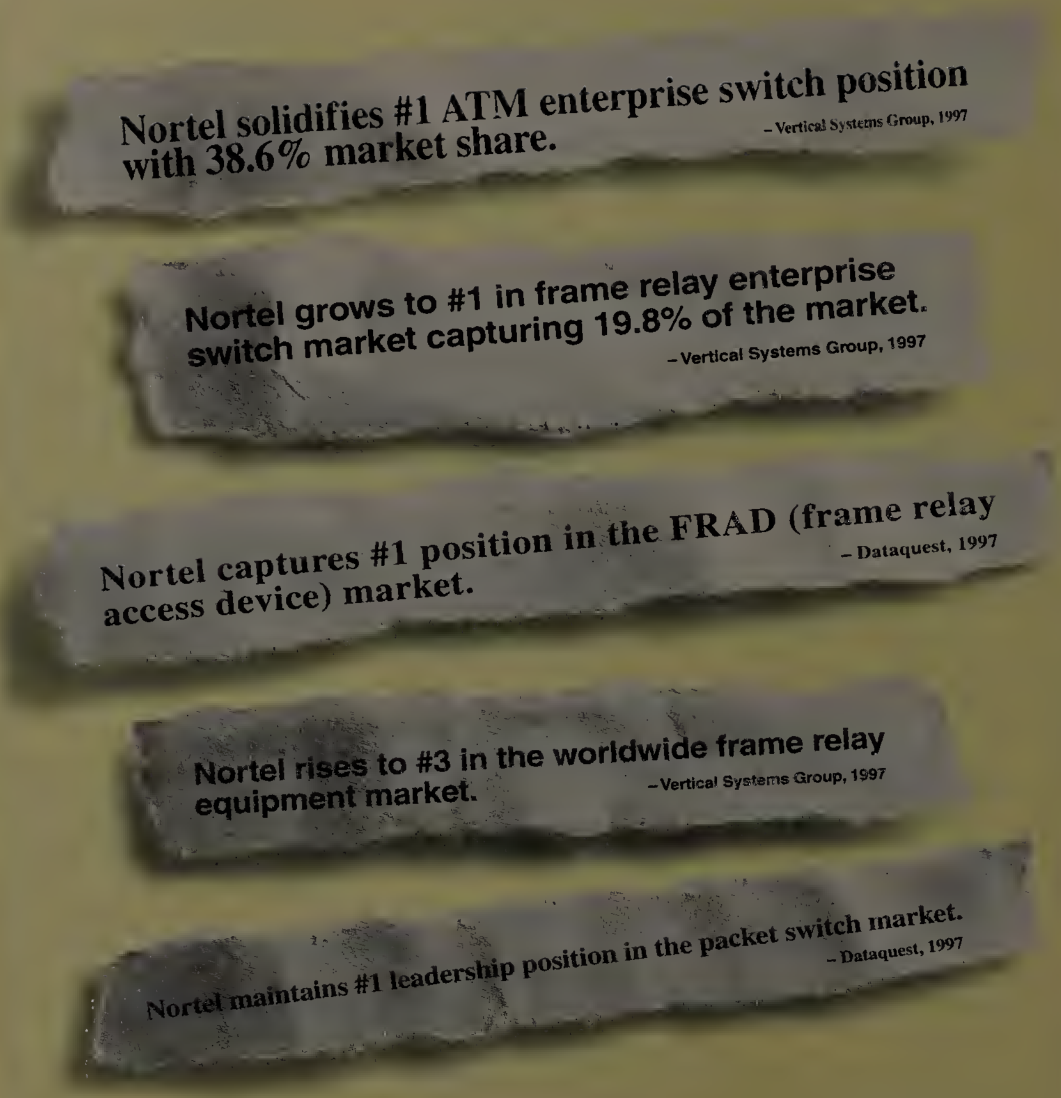

Nortel solidifies #1 ATM enterprise switch position with 38.6% market share. – Vertical Systems Group, 1997

Nortel grows to #1 in frame relay enterprise switch market capturing 19.8% of the market. – Vertical Systems Group, 1997

Nortel captures #1 position in the FRAD (frame relay access device) market. – Dataquest, 1997

Nortel rises to #3 in the worldwide frame relay equipment market. – Vertical Systems Group, 1997

Nortel maintains #1 leadership position in the packet switch market. – Dataquest, 1997

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Carriers & ISPs

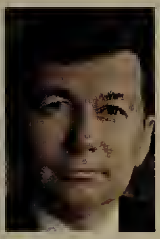
Covering: The Internet • Interexchange and Local Carriers
Wireless • Regulatory Affairs • Voice Equipment

Briefs

■ **MCI Communications Corp.** *has urged the* **Federal Communications Commission** *to consider requiring regional Bell operating companies to divest themselves of their "bottleneck" last-mile switching and copper facilities.*

Under MCI's proposal, those facilities would be controlled by a separate company that would make the operations available to all eligible local carriers. MCI's proposal goes a step beyond a recent proposal by smaller long-distance carrier LCI International, Inc.

LCI suggested each RBOC be allowed to choose whether to separate its network and marketing operations; those that did would be given a regulatory "fast track" into long distance.


Allegiance's *Hundt*

■ *Former Federal Communications Commission Chairman* **Reed Hundt** *has found himself a job in the private sector with Dallas-based* **Allegiance Telecom, Inc.** *as a member of its board of directors.*

Allegiance, a competitive local exchange carrier run by former MFS Communications, Inc. chief Royce Holland, sells local and long-distance voice, data and Internet access services.

■ *National fiber carrier* **Qwest Communications International, Inc.** *is back on the acquisition trail. It will pay $154.4 million in stock and cash for Amsterdam-based business Internet service provider* **EUNet International BV.**

Qwest expects to link EUNet's 13-country European backbone with the Qwest U.S. network via capacity on the trans-Atlantic Gemini cable owned by WorldCom, Inc. and Cable & Wireless plc.

RBOCs seek back door to 'Net backbone entry

Three Bells file petitions to enter long distance just for advanced data services, using little-known Telecom Act provision.

By David Rohde
Washington, D.C.

Surprise: Your friendly regional Bell operating company could become a regional or national Internet or private IP backbone provider under a little-known legal provision now before the Federal Communications Commission.

Three of the five RBOCs have filed petitions with the FCC to carry long-haul broadband data traffic without FCC approval, in order to enter the regular long-distance market.

Ameritech Corp., Bell Atlantic Corp. and US WEST, Inc. are invoking Section 706, an obscure provision of the Telecommunications Act of 1996 that requires the FCC to knock down regulatory barriers to broadband infrastructure development.

Gathering dust

Section 706 has gathered dust on telecom lawyers' bookshelves for two years while RBOCs have pushed for complete long-distance authority under the act's better known Section 271. That's the part of the 1996 law that requires RBOCs to meet a 14-point competitive checklist for local competition before breaking out of their local calling areas — a standard no RBOC has yet achieved.

But now Section 706 is coming to the fore because the Internet's demand for new capacity coincides with a key regulatory deadline. Congress required that within 30 months of enactment of the telecom reform law, the FCC must demonstrate that it has either torn down regulatory barriers to broadband deployment or has a plan to do so. That deadline is this August.

One option to show such action Congress gave the FCC was to "forbear," or not enforce, existing regulations, such as those that require RBOCs to stay within local access and transport areas (LATA). Ameritech, Bell Atlantic and US WEST have decided to force the FCC's hand by filing Section 706 petitions.

True backbones?

Even if the RBOCs got the authority, it is not clear how quickly they could bring up true backbone-network capacity. In a petition, Bell Atlantic claimed the company is "in the final planning process for its broadband deployment."

Forcing the issue

Timetable by which three RBOCs have applied under Section 706 of the Telecommunications Act of 1996 for the right to build high-speed broadband networks and carry traffic past traditional boundaries.

Jan. 26, 1998: Bell Atlantic files Section 706 petition

Feb. 25, 1998: US WEST files Section 706 petition

March 5, 1998: Ameritech files Section 706 petition

April 6, 1998: Comments due to FCC on these petitions

Aug. 8, 1998*: FCC must begin inquiry on whether it should remove rules preventing some carriers from building advanced data networks

* No later than this date, which is 30 months after the enactment of the Telecommunications Act of 1996

But last week, when Bell Atlantic announced a new $1.5 billion construction program, the RBOC said it would take five years to fully build out an IP-capable regional Synchronous Optical Network (SONET) with speeds from OC-3 to OC-192.

Numerous parties, including long-distance carriers, are expected to oppose the three RBOCs' petitions in comments due today at the FCC (see graphic).

Still, Bell Atlantic has corralled support from enterprise network managers. Anthony Tanzi, director of communications at Brown University's Computing and Information Services unit, in Providence, R.I., said he has been unable to obtain a T-3 link from Providence to Boston.

"Our service requests to MCI have been rejected due to lack of capacity," Tanzi told the FCC in a filing supporting Bell Atlantic's petition. ■

Redback switch speeds delivery of DSL services

By Tim Greene
Sunnyvale, Calif.

Redback Networks, Inc. last week introduced a custom ATM switch that enables service providers to offer users a broad range of digital subscriber line (DSL) services.

The Subscriber Management System (SMS) 1000 switch takes in trunk lines from different DSL service providers, authenticates users and switches traffic to the appropriate destinations.

That capability enables service providers such as Concentric Networks Corp. to sell a wider variety of DSL services to more customers sooner than they would be able to otherwise, according to Jim Southworth, director of advanced network services for Concentric.

"It would not be nearly this easy without the Redback box," Southworth said.

Many companies that sell DSL services, including Concentric, buy the DSL access part of the service from other vendors.

In the San Francisco area, Concentric resells DSL access from three different providers — Pacific Bell, Covad Communications Co. and NorthPoint Communications, Inc.

Each of these providers sends Concentric customer traffic as a slightly different flavor of DSL, depending on the DSL hardware each uses.

Get more online: FIND IT ON FUSION 6535
- A database of DSL deployments
- Asymmetric DSL primers

www.nwfusion.com

Concentric needs to resolve differences in format and signaling among the traffic and switch it as Ethernet to Concentric's core routers, Southworth said.

The SMS 1000 takes in ATM trunks from Pacific Bell, Covad and NorthPoint that carry DSL traffic to and from Concentric customers. The switch can authenticate users through a Remote Authentication Dial-In User Service (RADIUS) database and convert the traffic to Ethernet. Using the RADIUS profile, SMS 1000 can permit customer access to multiple simultaneous destinations, such as a corporate network or the Internet.

Buying DSL access from another carrier gives Concentric a greater range of DSL options to sell than it could provision itself, Southworth said.

Pacific Bell, Covad and NorthPoint offer slightly different service speeds and cover overlapping but different service areas. Dealing with all three maximizes the area in which Concentric can offer DSL service, Southworth said.

Buying DSL access from other providers also streamlines the process of delivering DSL.

Verio, Inc., a Denver-based Internet service provider, found it much easier to buy DSL access than to become a competitive local exchange carrier and provide the access itself, according to Chris Ward, the company's vice president of engineering.

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EYE ON THE CARRIERS

Drumming up merger opposition

Who is Jamie Love, and what's his beef with Microsoft, WorldCom and MCI?

Denizens of various newsgroups already know part of the answer. James Love, who calls himself Jamie, is a Washington, D.C. policy wonk who heads the Consumer Project on Technology, Ralph Nader's vehicle for IT issues.

Recently, Love has been all over town — and all over the Internet — complaining about Microsoft's bundling practices and the proposed WorldCom/MCI merger. His modus operandi in these two seemingly unrelated controversies has been the same. In addition to handling legal filings and online advocacy, Love has organized conferences that wind up being dominated by these companies' opponents, ostensibly because the companies being attacked won't show up.

David Rohde

True to form, the recent conference to examine the "threat" posed to the Internet backbone by the WorldCom/MCI merger began as an objective look at the deal. But it turned into a bashing session, with Love proving to be a passionate opponent of the merger.

So I was surprised when I called Love the next week and he calmly told me that he originally hadn't planned to do much with this issue because the case against Microsoft and other antitrust matters were taking up most of his time.

Love told me the conference was actually paid for by the conference's other cosponsor — the Communications Workers of America (CWA), the telecom industry's main labor union.

"We were kind of shamed into doing it by Debbie Goldman at the CWA," Love said, referring to the union's point person on the merger.

Now, supposedly, most of the merger opposition is due to fear that WorldCom's constituent companies could corral the Internet backbone and make interconnection with other providers unaffordable. Even much of this opposition seems to tie back to CWA.

It was the CWA that called up a Utah Internet service provider general manager who happens to be a political activist and, as we recently reported, got her to try to sign up other ISPs in an antimerger backlash.

Union funding also appears to be behind a ham-handed attempt to put an academic gloss on the merger opposition. The Economic Policy Institute (EPI), a Washington, D.C. think tank that receives funding from unions and foundations, recently released two reports dealing with the merger called "Monopoly.com" and "Bad Deal of the Century."

"Monopoly.com" cites mathematical formulas traditionally used by antitrust experts to show that the merger would probably constitute an anticompetitive concentration of power. But its author, Jeff Keefe, is a Rutgers University associate professor who specializes in labor issues and concedes that this was a new area for him. "I'm not an antitrust expert," he told me. Nevertheless, he was asked to do the study by an old contact at EPI.

CWA hasn't had much success unionizing MCI facilities, and cost-obsessed WorldCom is hostile to unions. It's good to know the CWA is suddenly fascinated by the inner workings of the Internet. How much of this interest is genuine is another question.

Rohde is Network World *senior editor, Carriers & ISPs. He can be reached at david_rohde@nww.com.*

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Internet access

Global roaming and beyond

By Denise Pappalardo

Whether you're in Chicago or Bangladesh, chances are you want to access the Internet and your corporate network, and exchange e-mail without paying a fortune in long-distance fees.

Many national Internet service providers have been making local dial Internet access easier and less expensive for business users. These ISPs have been adding dial-in points of presence in cities around the country as well as overseas.

Even local and regional ISPs have found a way to offer their customers global Internet access by joining IPass, Inc. or Gric Communications, Inc., two global roaming ISP consortiums.

If your company has switched to local dial Internet access services from either a company such as CompuServe Network Services (CNS) or an ISP consortium, you're probably saving thousands of dollars every month.

LOCAL DIAL-IN POPS AROUND THE WORLD

Many Internet service providers are offering their customers local dial-in support around the country. This makes it easier and less expensive for mobile workers to access their e-mail and the Internet when traveling.

ISP	Number of local dial-up POPs in the U.S.	Number of dial-up POPs internationally
AT&T WorldNet	375	66
CompuServe Network Services	430	570
GTE Internetworking	277*	311*
IBM Global Services	503	850
UUNET	590*	99*

*Number of cities

Cincom Systems, Inc., a Cincinnati-based software manufacturer with offices in 24 countries, was using remote access services from Infonet Services Corp. before the company switched to CNS a year and a half ago. "We are now saving $15,000 per month with CNS," says Bill Dyer, director of information systems and technical services at Cincom.

About 500 of Cincom's 1,100 employees access CNS' local dial-in POPs around the world to connect to Cincom's WAN and the Internet, Dyer says. Infonet's services included some 800 number access, but because you can't use 800 numbers in every country, Cincom was consistently paying high international long-distance bills.

CNS and its main competitor, IBM Global Services, have been expanding their dial-up networks for several years. CNS and IBM have been deploying local dial-in POPs in major metropolitan areas in the U.S. and around the world.

The two companies provide users with a list of local dial telephone numbers in all of the cities where they offer global roaming. With this list, users are able to access their corporate intranet or the Internet with the same ID and password that works from their home office.

CNS and IBM have extensive experience in deploying international POPs. CNS deployed its first international POP 11 years ago in Tokyo.

The more traditional ISPs also are hard at work expanding their global roaming support. UUNET Technologies, Inc., GTE Internetworking and AT&T WorldNet are continually adding dial-access POPs to their infrastructure or partnering with other providers to expand the reach of their dial networks.

UUNET offers local dial Internet access in nearly 100 cities around the world. These POPs are run by UUNET affiliates. GTE Internetworking, on the other hand, is supporting local dial access in 311 cities internationally, through a relationship with Equant Network Services.

GTE is expanding its Internet backbone in North America and around the world, and will ultimately build and maintain its own local dial access POPs overseas.

Other national ISPs also have joined global roaming consortiums. For example, PSINet last month teamed with IPass to offer PSINet customers local dial access from 150 countries. More than 300 ISPs make up IPass' global roaming network.

IPass' international presence was one of the primary reasons PSINet chose to go with a consortium. PSINet is the only remaining independent top-tier ISP.

Roaming employees

Some PSINet customers have been waiting for international dial access since last year. Carbo Ceramics, Inc., an Iberia, La.-based company, has been a PSINet customer since October. Approximately 35% of the company's employees travel in the U.S. and internationally.

The company just started using PSINet's global roaming service last month. While the company expects a cost savings, the main reason Carbo is using the service is convenience, says Barney Lejeune, information technology manager at Carbo.

When the company's mobile workers are out in the field they need to be able to easily send and receive their e-mail, Lejeune says. He expects all of his mobile workers to be using the PSINet service within the next two months.

Global roaming consortium companies allow ISPs such as PSINet to expand the reach of their dial access services. But IPass and Gric also are expanding their service portfolio to offer ISPs and their customers new options. Gric and IPass support settlement and authorization services for global roaming users. Gric supports more than 250 ISPs in 75 countries.

Gric also is expanding its service reach to offer ISP customers IP fax-to-fax support with NetXchange Communications, Inc.'s fax server software. While all of Gric's 250 ISP customers can sign up for the fax service, it currently is only available in 10 countries. Once the PC-to-fax version is available, however, Gric expects more ISPs to sign up.

According to Hong Chen, CEO at Gric, the company is working with Cisco Systems, Inc., Lucent Technologies, Inc. and Siemens AG to develop and deploy an IP telephony service for ISP customers.

But Chen concedes there are interoperability and quality-of-service issues that need to be addressed before IP telephony can be a full-blown service.

Interoperability is still an unresolved issue, even though IP telephony gateway vendors are coming out with standards-compliant products. "We want a network that can be based on multiple gateways," Chen says. He expects Gric's IP telephony service to be commercially available in June.

IPass is deploying IP telephony services as well, but the company is taking a different route. IPass has teamed with ITXC Corp., an IP telephony wholesale provider start-up. IPass will be providing settlement services to all of ITXC's ISP customers, which also may be IPass customers, says Chris Moore, CEO at IPass.

ISPs will be able to sign up for the service next month, Moore says. IPass and ITXC are providing a way for an ISP to offer IP telephony services without forcing the customer to make a capital investment in hardware. ■

ACCESS THE INTERNET LOCALLY AROUND THE WORLD

IPass and Gric Communications, two internet access/global roaming consortiums, are getting into new areas of service.

IPass

- Has 300 ISP partners.
- Lets users connect to the Internet locally from 150 countries.
- Struck a deal with ITXC to offer ISP customers of IPass Internet telephony support.

Gric

- Has 250 ISP partners.
- Lets users connect to the Internet locally from 75 countries.
- Has been offering IP faxing services since late last year.
- Struck a deal with Cisco, Lucent and Siemens to develop a common API and settlement system to support Internet telephony services.

Intranet Applications

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Briefs

■ *As the first major action in its* **electronic commerce** *line since its acquisition of Actra Business Systems LLC late last year,* **Netscape Communications Corp.** *announced an upgrade to ECXpert, an application in its CommerceXpert suite.*

ECXpert 1.1 adds certification with Oracle Packaged Applications and integration with Lightweight Directory Access Protocol. It also enables secure e-mail through Communicator. ECXpert is available now for Solaris and will be out for Windows NT by the end of this month. Pricing is $75,000 for a two-processor system.

■ **Symantec Corp.** *last week announced Norton AntiVirus for Microsoft Exchange Server,* **antivirus software** *that scans incoming files and attachments to detect and eradicate computer viruses. Scheduled to ship in July, Norton AntiVirus for Microsoft Exchange Server costs $795 per server for a 25-user license.*

✆ Symantec: (800) 441-7234

■ **Cardiff Software, Inc.** *in mid-April will begin shipping TELEform Elite Version 5.4, an upgrade to its NT-based* **automated data-collection** *software that will be able to integrate data collection with imaging systems. The PC-based TELEform Elite Version 5.4 sells for $4,995.*

✆ Cardiff: (800) 659-8755

■ **Intraware, Inc.** *this week unveiled Compariscope, a new Web-based service that assists IT managers in making purchasing decisions by highlighting the strengths and weaknesses of the leading* **intranet applications.** *Access to Compariscope is priced at $10,000 per enterprise, but companies may purchase individual segment reports for as little as $250. Intraware is making Compariscope available on a complimentary basis through the end of May at www.intraware.com.*

XML document management tools debut

New Web format creates richer electronic documents from multiple data sources.

By Ellen Messmer

The Extensible Markup Language standard was just finalized, but a new breed of document managment tools based on XML's neutral format for structured data is already set to debut.

Interleaf, Inc., in a co-development agreement with Microstar Software, Ltd., plans to release an NT server-based product called BladeRunner by year-end. BladeRunner is a desktop publishing tool that turns nearly any document into XML format. This provides a high degree of flexibility, proponents claimed. "Once you have it in XML, you can generate it as HTML or Word or anything else," said Jaime Ellerston, president and CEO of Interleaf.

Interleaf's *Ellerston*

The advantage of the World Wide Web Consortium's XML standard is its facility in assembling text and data from a variety of sources. That way, a user can create a complex electronic document that can still be easily searched or sent over the Internet, typically using HTTP.

BladeRunner will make use of Microstar's Near and Far XML authoring tool for creating user- or industry-defined Document Type Definitions (DTD). A specific XML DTD would let a user validate XML content to ensure it has been structured in the intended way.

DTDs are expected to be widely used in electronic commerce applications, such as purchase orders, shipping notices and Web forms.

Interleaf and Microstar aren't the only vendors taking steps to implement XML. Xerox Co. spinoff Chrystal Software already has started shipping an XML content management system called Astoria 3.0 that can be searched with the Verity search engine. Astoria 3.0 starts at $42,000, according to Sean Baird, Chrystal Software product manager.

> *"Once you have it in XML, you can generate it as HTML or Word or anything else," Ellerston said.*

WebMethods, Inc. last month announced the XML-based B2B Integration Server, which will automate the exchange of data between applications, Web sites and legacy data sources such as electronic data interchange. The B2B Integration Server, scheduled to ship in the second quarter for Unix and NT, costs $12,995.

Other companies lining up behind XML include Interwoven, Inc. with its TeamSite tool for Web site development; Inso Corp. with Version 4.0 of its Dynatext Professional Publishing System; and DataChannel, Inc., which just released the DataChannel XML Development Kit — Professional.

And, of course, vendors that already support the Standard Generalized Markup Language will be adding XML — which at heart is simply SGML's simpler, easier-to-use cousin — to their lines of document management products. These include Texcel International and Kinetic Technologies. ■

Get more online:
- XML primers and specifications
- XML news

6536

Some firewalls fail security test

Many NT-based firewalls flunking because of rush to market.

By Ellen Messmer
Carlisle, Pa.

Not all firewalls are created equal, at least according to test results recently released by the International Computer Security Association (ICSA).

In fact, the association warned of a sharp rise in the number of firewalls that flunk the organization's certification tests.

In particular, newer NT-based firewalls often did not stand up to the hacker-style stress test methodically delivered by ICSA labs in the most recent round of evaluation tests, said Pete Cafarcio, ICSA firewall program manager. He blamed the sharp decline in passing grades over the past year on vendors' "rush to market, with a resulting lack of due diligence."

ICSA's *Cafarcio said, "A lot of the new firewall products are just not passing the tests."*

It's a seller's market

"It's sell, sell, sell" because the firewall market is so hot, Cafarcio said. "Over the past year, only 38% of products we tested passed without having to be fixed or [given] a patch. And 6% couldn't pass at all," he said.

ICSA tests firewalls to ensure they can be properly configured to withstand hacker attacks via File Transfer Protocol, Simple Mail Transfer Protocol, HTTP, telnet, Domain Name System, Secure Sockets Layer and Secure Hypertext Transfer Protocol. In addition, ICSA now tests for each firewall's ability to cope with denial-of-service attacks.

Not all NT-based firewalls proved to be vulnerable, though. The latest lab results, available online at the ICSA Web site, show that eight NT-based firewalls, including those from Cisco Systems, Inc., Check Point Software Technologies, Inc., Raptor Systems, Inc. and Secure Computing, Inc. made the grade.

However, Microsoft Corp.'s firewall and Web-caching product, Proxy Server 2.0, does not appear on the latest ICSA list — even though Microsoft is an ICSA member.

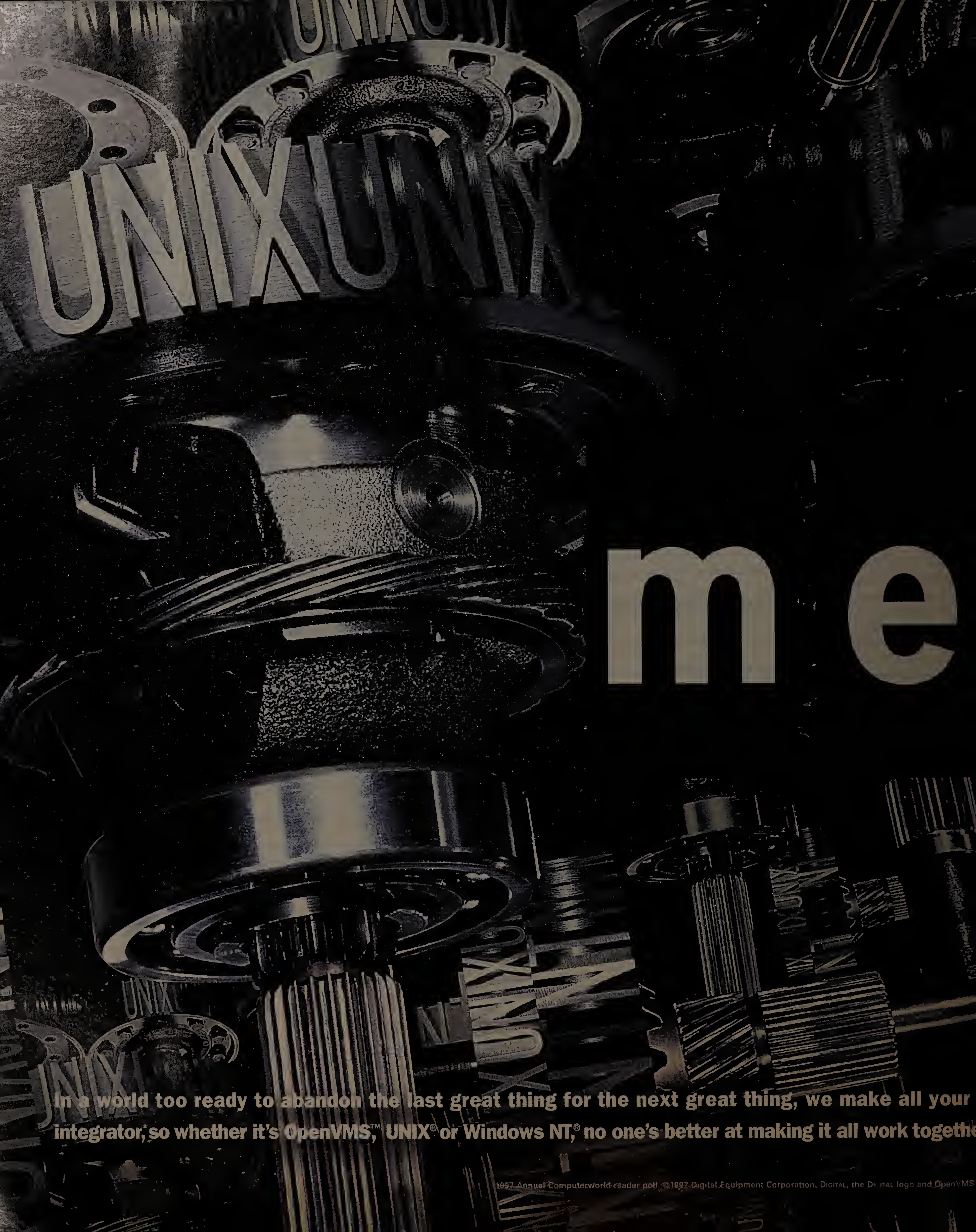
Cafarcio said he was not at liberty to discuss specific products that didn't make the grade, but he noted that the ICSA's testing showed it's harder to build a good firewall on top of NT than on Unix or proprietary operating systems. "The fact is, for NT you need to lock more things down," Cafarcio said.

Cisco passes test

The good news is ICSA said it will be adding Cisco's IOS firewall to the "pass" list. The Cisco IOS firewall lets managers set up access lists, encryption, TACACS, Remote Authentication Dial-In User Service and router-to-router authorization for Cisco's 1600 and 2500 series routers.

The routers, which can handle blocking of Java code based on IP address, now are certified under the guidelines of ICSA testing to appropriately detect and prevent certain denial-of-service attacks.

However, Cisco won't be adding this type of security-management and reporting support to its central configuration console until July, said Jocelyn Okrent, IOS firewall product manager. "There's a bit of a lag," she acknowledged, but added that the IOS firewall security logs can be converted into an easily readable format today using Open Systems Solutions, Inc.'s product, PrivateI. ■



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NET INSIDER

Engendering disgust

I have resisted writing about spam mail for a long time — actually since mid-1994. But this is not to say that spam is far from my mind.

It would be hard to forget the issue considering how many spam messages I get per day. Judging from the fact that all too many of the messages are advertisements for companies that want to send spam mail for me or will sell me the software to do it myself, things are not likely to get better soon.

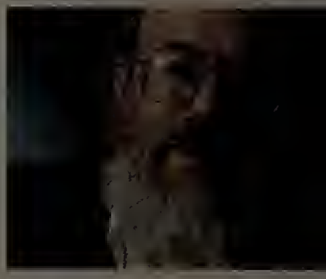
Some people still claim that spam is not a problem because you can just delete unwanted messages and move on. But I wonder if those people actually use computers.

If they do use computers, I'm sure they do not subscribe to AOL. The figure on spam most often cited of late has been that as much as one third of the mail on AOL is spam. It gets more than a bit tiring to retrieve and delete all the junk.

I've decided to revisit the question of spam at this time because of the reception Sendmail, Inc. has received to its recent announcement of antispam technology. This announcement was a big story to most of the major U.S. news organizations, including *The New York Times, The Wall Street Journal* and CNN. The FBI's decision to send out its own spam (www.firstbase.com/fbi.htm) also has prompted me to write on the subject of spam again.

The Sendmail improvements try to make it harder for companies that send spam to hide their actual location. These companies often try to hide their location to avoid the angry return mail and the notifications of bounced mail. These companies redirect this mail to some innocent third party or to someone that they do not like.

The Sendmail improvements also try to keep spam senders from using third-party computers to do the actual sending of the mail. These improvements should be quite a help, but the problem will not go away easily.



Scott Bradner

Junk fax problem solved

A few years back junk faxes were a big problem, but they have just about disappeared in the U.S. Two seemingly minor changes in the legal landscape seem to have done the trick. First, you're not allowed to send faxes to people who don't want them. Second, all of the information on the fax — including the sender's identity — must be accurate or the assumption is that the sender is attempting to commit wire fraud, which is a felony.

The same steps might work for solving the spam problem.

The business of spam must be controlled if the Internet is going to get close to its potential. A future in which hundreds of thousands of companies are sending unwanted mail to millions of people is not pleasant to imagine.

It does continue to amaze me that some people are eager to engender the disgust of millions in order to get the business of a few hundred. But immunity to disgust seems to be a feature of the people who are in this type of business.

Disclaimer: I trust Harvard engenders more envy than disgust, but in any case, the above are my laments.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

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Technology Update

Covering: Evolving Technologies and Standards

NUTTER'S NETWORK HELP DESK

Ron Nutter, a Master Certified Novell Engineer and Groupware CNE in the Lexington, Ky., area, tracks down the answers to your questions. Call (800) 622-1108, Ext. 7476, or send your questions to rnutter@world.std.com.

We are a Novell, Inc. IntranetWare, Microsoft Corp. Windows 95 shop. I would like to know if you could recommend an easy procedure for upgrading Win95 clients to IntranetWare Client 2.20 for Windows 95 using the Automated Client Update (ACU) option.

Via the Internet

Assuming you are using an earlier version of the Novell Client 32, you have two options. If you are managing your applications on the server using Novell Application Launcher, you can configure the IntranetWare Client setup.exe program as a NAL object with /ACU as a command-line option. By specifying this program with a forced run option, you can have the clients update automatically when they log in.

The other option is to put @F:\PUBLIC\CLIENT\WIN95\SETUP.EXE /ACU in the appropriate login script — container, profile or user, depending on what is easiest for your configuration. If you are using the Microsoft Client for NetWare Networks, the latter option will be the easiest to use for upgrading the clients to the IntranetWare Client.

You should take a close look at the Snapshot program that comes with Version 2.2 of NAL. It allows you to document changes to the registry, .ini files and others that occur at a workstation when an application is installed. Users or support staff can then use the program's Verify option when an application stops working to see if there are any missing files that need to be replaced.

If you are using Microsoft Office 97, you probably will want to download novellnp.exe from Novell's support.novell.com Web site. This executable file addresses the problems that occur when a client loses drive mappings when entering or exiting any of the Office 97 applications. Be aware that this is a beta release file, so you should only use it if you are experiencing this problem with your clients.

Avoiding headaches: How to evaluate your remote network management provider

By Bob Pojman

So you decided to outsource the management of your network because you wanted to devote internal resources to other key issues, such as an Internet strategy, rolling out a new networked application or Year 2000 issues.

A good idea is to think through your requirements and needs up front. Then you'll be able to more easily select a vendor that not only will do a good job, but also can provide the performance metrics to help you verify the results.

Typical performance metrics include Mean Time to Repair (MTTR); response time to outages, or how quickly the vendor starts working on an identified problem; and escalation time frames, or how soon a problem is made a priority if it hasn't been solved.

Key ingredients

While these metrics provide some indication of activity, they don't necessarily tell you how effectively the supplier is providing what you really want: high application availability across the network and good performance at the lowest cost.

Here are some key items that can help you evaluate your vendor:

- Network availability: What level of availability is the vendor providing, and how much of the network is the vendor taking responsibility for?

In the WAN, you want availability reported from router to router — DSUs/CSUs, local loops and wide-area transport included. Guaranteed availability is best, but you at least should expect monthly reports showing network availability, along with an analysis of all the trouble tickets for the month.

- MTTR histograms: The length of time your network outages last is important to know, but the mean time isn't necessarily the best indicator of your management provider's performance. Histogram data of restoral times will give you far more useful information. In some cases, the MTTR can be inflated due to a single long outage, giving the appearance of poor vendor response.

A histogram of the outage times can help you evaluate MTTR more effectively.

Even better is a vendor that will categorize your trouble tickets by outage cause and provide histograms at that level.

This enables you to evaluate the performance of a range of service providers, including the interexchange carriers, local exchange carriers, equipment maintenance vendors as well as the network management provider.

- Proactive notification: The network goes down and a user calls you to complain. Do you interrupt the project you're working on to notify your provider of the outage?

You shouldn't need to, because a good vendor will have seen the outage within the first two minutes and then notified you within 15 minutes — as soon as the vendor had enough time to make a preliminary assessment of the problem.

Why is this important?

First, if management providers don't start troubleshooting until you contact them, you've lost precious time getting the network back up.

Second, you don't have time to interrupt your work to call in the problem.

Keeping the faith

A good provider will proactively call you more than 90% of the time. There are some problems the provider won't see before you do — dropped SNA sessions or performance issues, for example — but 90% is achievable with strong tools and processes.

The provider each month should also document as part of a trouble ticket history report the percentage of proactive notification.

Other important criteria are harder to quantify.

Has your provider called you each month to review network performance and utilization reports and make recommendations on improving performance or reducing costs?

Staffing breadth and depth is also key. Do you interact regularly with people who know your network? When your main contact is unavailable, can someone else help who is already familiar with your network? Can the staff address a wide range of issues effectively — not just router problems, but also transport issues, LAN issues and performance planning?

Not a complete list

While the points presented here aren't exhaustive, to evaluate the performance of network management providers you should focus on applications availability and proactiveness.

Make sure providers report their performance and are treating you as if they are part of your organization.

Pojman is vice president of operations at NetSolve, Inc., a managed network service provider based in Austin, Texas. He can be reached at (512) 795-3000.

UP CLOSE

Evaluating remote network management providers

When evaluating any vendor that will be running and managing your network, high availability and precise monitoring are the goals. In a WAN, you want availability reported from router to router – DSUs/CSUs, local loops and wide-area transport included. The level of availability you should expect will vary based on the size and design of your network. From a guarantee perspective, look for 99.5% uptime on router to router connections for a small network, and as much as 99.8% to 99.9% for a large network.

A good provider will deliver:

- Network performance and quality-of-service guarantees
- Guaranteed response time management and performance threshold monitoring
- A set of enforceable network performance and fault management policies
- The ability to monitor, diagnose and isolate problems in real time
- The ability to correlate problem cause and effect
- Services to help your company with capacity planning and predicting future management needs
- Proactive notification – if a network link goes down, the management vendor should notify you within 15 minutes with a preliminary assessment of the problem

Need information?

Let *Network World* provide a quick primer on an important or emerging technology. If you have an idea for Technology Update, contact Michael Cooney by phone at (508) 875-6400 or e-mail at michael_cooney@nww.com.

EDITORIAL *insights*

Have another donut, you fat client!

Ever notice how vendors always yap about meeting customer demand, keeping close to the user, being market driven, blah blah blah?

In most cases, it's all a bunch of bunk.

Take one of the basic necessities of network life, for instance — the client. A few years ago the notion of a thin client emerged, and IS professionals began to dream of a world that didn't require constant and expensive PC upgrades to run increasingly bloated software.

But the thin-client promise of Java-based network computers (NC) now is wearing thin, what with all the downloading of applets, middleware and whatnot. As applets grow, these NC babies may need as much upgrading as our beloved Compaqs.

Of course, the PC situation remains a good deal worse. Every time Microsoft releases an operating system or new productivity suite, it requires tons more RAM and hard drive space. In most cases it is easier to toss out your old clunkers and just buy speedy new ones, knowing full well that those will only last a few years before becoming door stops.

Microsoft has always gotten away with this, despite end-user grumbling. It just keeps plowing ahead, building software largely aimed at shoring up demand for RAM, faster Intel chips and new PCs. Are vendors the customers Microsoft is catering to, because Microsoft sure doesn't have my best interests in mind.

Thanks *Network World*

My company was generous enough to spend about 10 grand on a new laptop and a ripping desktop a couple of years ago. I love both. But Microsoft is pushing us all in the direction of NT workstations, and this pig won't boot on my laptop and would likely crawl like a baby on my desktop. Is *Network World* supposed to spend another wad to keep me current? I think not.

I asked Microsoft how it can justify building operating systems that are beginning to require 32M, 64M, and maybe in a couple years 128M bytes of RAM to run. The answer? It is all to make things simpler. Let me get this straight. I get a 64M machine, load the 30 million plus lines of NT code, get about a zillion new features and suddenly my system is easier to use? They must be guzzling more than latte in Redmond.

Microsoft should realize it's a whole new world. We don't get excited about huge new operating systems. We are bored with applications. The cool stuff is not loaded on our system, but is simply temporarily downloaded for our viewing pleasure. It is called the Web and it don't require no stinkin' 64M.

Maybe the NC isn't such a bad idea after all.

Doug Barney, news editor dbarney@nww.com

Intranet Adviser • Daniel Blum

Brute force has no place in e-mail migrations

Aware of the time bomb ticking away in e-mail systems that aren't Year 2000-compliant, such as Microsoft Mail and cc:Mail, users are ready to make the move to client/server messaging and groupware. Last year, the number of cc:Mail users increased by less than two million seats, and Microsoft Mail's installed base actually declined by over a million seats. At the same time, Lotus Notes gained 10 million users and Microsoft Exchange usage grew by 7.5 million.

Vendors cater to users' migration needs by offering utilities for transferring stored messages from users' old mailboxes to their new ones. These migration utilities target not only the vendors' legacy systems, but also those of their competitors.

However, some enterprises have found migration to be a painful process, particularly those that have taken the brute-force approach of migrating all their users over a short time period.

In such cases, stored messages may be lost or discarded because of problems with migration utilities. Important data such as personal address lists, distribution lists for group mailings or shared folders and bulletin boards are often lost.

Overall, the brute-force approach requires a tremendously detailed logistical effort and is quite disruptive to both business processes and people. With training neglected in the rush, migration can turn into a hard sell, leaving angry users in its wake. It's easy for the process to fall behind schedule, leaving members of workgroups split across the old and new message systems and perhaps unable to communicate.

By contrast, a full-service migration that preserves stored messages and occurs in a phased manner reduces risk, is much less disruptive and is an easier sell internally. Vendors are beginning to step up to the plate, offering improved migration paths or full-service migration offerings. For example, Wingra Technologies describes its offerings as a "whole product" approach, including hardware and software, pre- and post-sales support, migration consulting services and integration of hard-to-port legacy applications.

Comprehensive migration offerings preserve customer choice. Steve Layne, general manager and vice president of messaging at Lotus, says, "It's not my job to run anyone off of older systems. But it is my job to get folks to Notes and Domino as quickly and painlessly as possible." Lotus offers users two options: They can move directly to the Notes client and Domino server or first upgrade to the cc:Mail R6.3 client, which can access either Domino server or the cc:Mail Post Office.

The lesson to learn is this: Treat migration as a process, not an event. The PC is the most expensive element to change in your network, and the user, the most difficult one. Make sure you budget for training and minimize the number of times you have to touch the desktop. Use the remote installation capabilities of products such as cc:Mail R6.3's Smart Upgrade, Microsoft's Exchange Setup Editor or Netscape's Mission Control to upgrade desktops automatically.

Give each user the appropriate level of capabilities. Lower end users in your organization might need only a basic e-mail capability, such as the cc:Mail R6.3 client, whereas knowledge workers may prefer the full Notes Desktop package or another groupware product.

Also, remember that until your migration is complete and the last user is moved, you are in a state of coexistence between the old system and the new one. During this time, you must provide e-mail gateways, directory synchronization and perhaps even calendar synchronization.

Be sure to develop a comprehensive migration plan that addresses cost, training and coexistence issues before making commitments to your managers, suppliers and internal customers.

Blum is a principal at Rapport Communication, a consultancy that focuses on intranet messaging, directories and groupware. He can be reached at dblum@mindspring.com or www.rapport.com.

MESSAGE QUEUE

Send letters to nwnews@nww.com or John Gallant, editor in chief, Network World, *161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification.*

NetWare vs. NT

We recently did a survey that showe many NetWare users are preparing to mo to Windows NT. In an online forum, w asked readers for their thoughts on this. He are some of their responses:

No one who has actually worked closely with NetWare and NT would ever recommend NT over NetWare as main network operating system (NOS The decision to switch to NT almost always comes from upper managemen because they have read some article or seen some commercial saying NT does this or that.

I have worked with both NOSes for

On Security • Winn Schwartau

What they never told you about VPNs

For the past several months, I have been inundated with Fedexes from countless vendors claiming they are in the virtual private network (VPN) business. I've been deluged with articles in the industry press on the importance of VPNs for business success and electronic commerce. I've seen 'Net-rant after 'Net-rant as to why "My VPN is better than your VPN."

And after studying up on VPNs and speaking to a slew of knowledgeable friends in the field, academics and more VPN vendors than I ever knew existed, I have come to the following conclusion: No one has the slightest clue what a VPN really is.

That is, except me.

If you believe the Internet Engineering Task Force and many vendors of related products, a VPN is loosely defined as "tunneling, or establishing encrypted channels over IP networks." I'm sure that means a great deal to the fearless corporate leaders who still have trouble turning on their PCs.

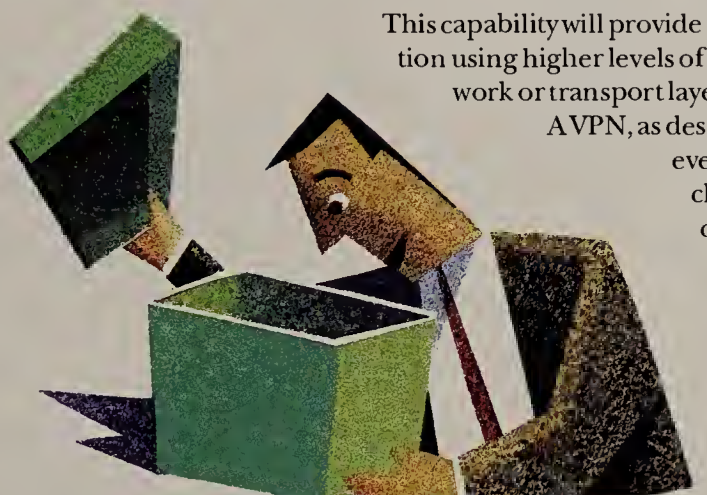
When clients ask me to help them implement VPNs, I ask them, "What are you trying to achieve?" It turns out they have little idea what they really want to do — which is not surprising given our current concepts of VPNs are about as naive as thinking you can run Windows NT on a 386 with 8M bytes of RAM.

Remember that the key word in VPN is virtual, meaning the individual packets can take any route to get from point A to point B. The encrypted secure channel is not a fixed pipe, as vendor diagrams would have you believe, but a dynamic, constantly shifting encrypted communications path that may move from your home laptop through Timbuktu to get to your headquarters.

That said, here are some of the things you were never told about VPNs.

VPN architectures are much more powerful than users are being led to believe. Classic VPN network diagrams show "secure" paths from one enterprise's server to a server at another physical location, with the Internet cloud fogging things up in the middle. Conceptually, this "connectionless connection" replaces dedicated X.25 or leased lines between remote offices and corporate divisions or from data center to data center. If this is all you need, fine, but the true VPN technology can do so much more in varying real-world uses.

One popular application is to use a remote client Web browser to communicate with a host server and thereby extract information from a database, conduct commerce or send e-mail in privacy. Using the IP Security concept of tunneling over IP as the only way to achieve a VPN, we again find a limited architecture. The non-IP intranet, dial-up users and other non-IP connections will not be able to access the VPN.



MARTY BRAUN

Most VPNs are of the server-to-server type and protect only an organization's perimeter from the ravages of the Internet. This provides point-to-point security but not end-to-end security all the way to the intranet desktop.

VPN designers are only beginning to investigate expanding the VPN security model to the interior of the sites' networks, through the intranets to the desktop. This capability will provide protection throughout the organization and will function using higher levels of the Open Systems Interconnection stack than the network or transport layer.

A VPN, as designed today, is a single-level security system. That means everyone with access to VPN resources has the same security classification. I find it odd that VPN designers don't use cryptographic mechanisms to provide data separation based on user identity — that is, give different users access to different sets of data.

In banking applications, for example, your average customer might not be given as much access to resources and information as elite private banking customers who might receive this perk due to their larger account balances. VPNs should address this user and data separation issue with a single security control rather than forcing you to build additional access control table mechanisms that require multiple levels of administration.

My kind of VPN would let me talk to the host server organization and to other VPN users privately, whether they be within the boundaries of the host site or sitting at a laptop on a ship. Current VPN architectures are remnants from legacy systems: We can talk to the mother ship but not to one another.

A VPN is supposed to make your business more competitive, more secure and easier to use. It is not supposed to be technology for technology's sake. Develop your business needs first, model the information flow and process that you would like to see, project what you think you'll need in a couple of years from a secure communications standpoint, and use that as your starting point.

The VPN business is too new to be locked into a short-term solution.

Schwartau is chief operating officer of The Security Experts, Inc., an information security consulting firm in Seminole, Fla., and president of infowar.com. He can be reached at winn@securityexperts.com or winn@infowar.com.

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years, and even though NT has its place (mainly in the Internet), it pales in comparison with NetWare as a true NOS.

Jayson Hahn
Manager of network services
Merrimac Industries, Inc.
West Caldwell, N.J.

Anyone who would consider moving a large network from Novell to NT without a decent administration application is just plain nuts. NT 4.0 is a bitch to administer in large networks, especially those running Novell for file and print services. Given Microsoft's penchant for making operating systems more complicated than necessary, I would not bet that NT 5.0 is going to be any nicer for administrators, nor will Active Directory.

Novell has been doing directory services for years, and I'm willing to bet it will be doing so long into the future.

Bob Winners
UCLA University Relations
Los Angeles

NetWare, in its current form, is due to go the way of the dodo bird, like VINES. However, it will be a long time before Novell becomes an insignificant factor, given its enormous installed base and the widespread "anything but Microsoft" sentiment.

It would be premature to fully back NT, with its present lack of robustness and scalability. That said, I like NT and have installed it in several departmental-level and small-business capacities with good success since its first release in August 1993. It has a great architecture, and low-end users are masked from underlying complexities unless they wish to use advanced features.

I also like competition. Don't count me among the Microsoft lemmings marching blindly down the NT path. I'm keeping my eyes and options open.

Roger Pyle
Dallas

Competition is good! Novell, I wish you the best of luck. Microsoft, keep doing a great job. Having these two rival NOSes helps keep both companies on the ball to create a better product.

NetWare has a great product for file services; Microsoft has a great product for client/server applications. The user's environment should dictate which NOS is used — perhaps both in the same environment. In any case, knowing the other guy is working on making a better, more robust NOS is incentive to keep technology flowing.

Jeff Lund
Network specialist
Raima Corp.
Seattle

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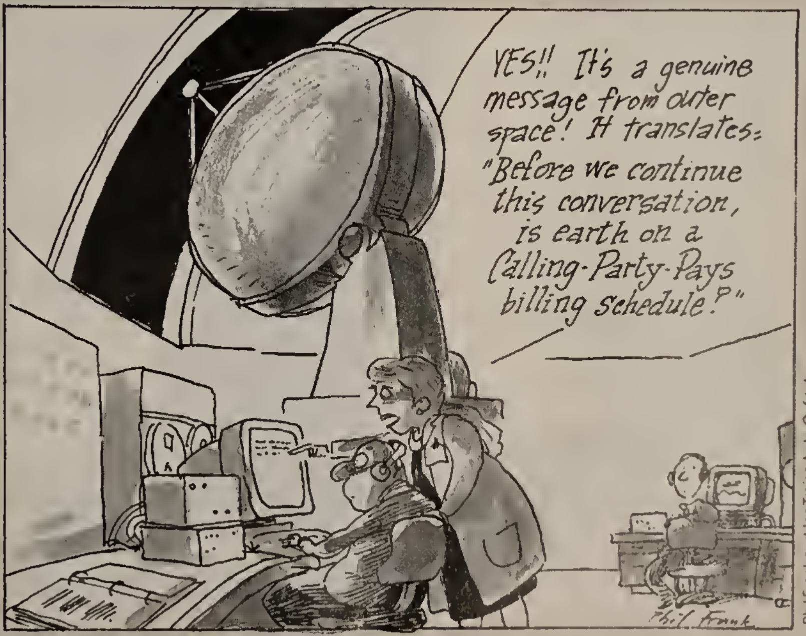
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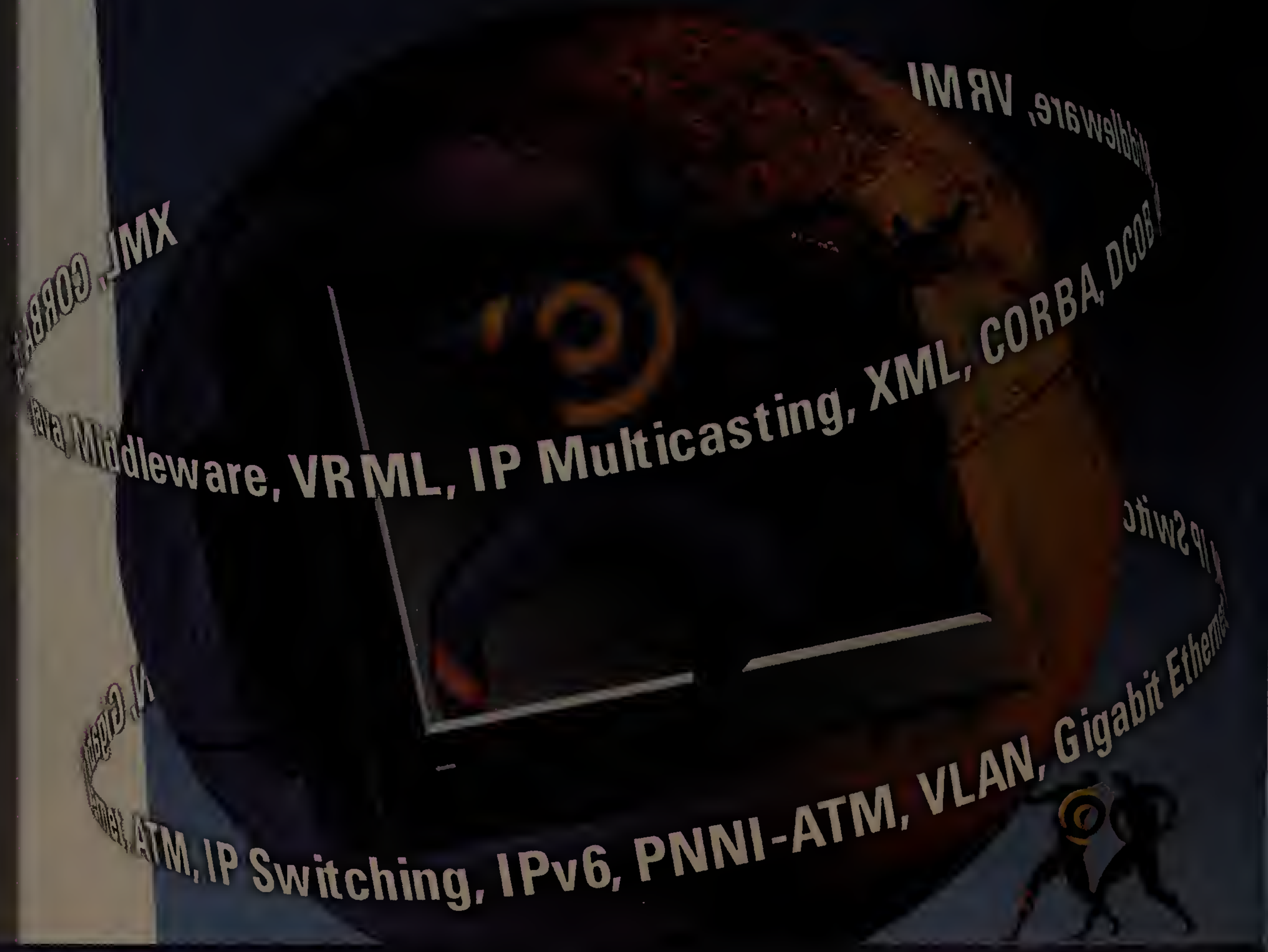

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Anura Gurugé

Seminar Overview:

Intranets have become synonymous with next generation enterprise networks and the Internet itself is becoming a gigantic, virtual storefront for global commerce. However, with all of their vast potential, Internet and intranet-based information systems have a fundamental flaw. They do not intrinsically support the mega repositories of data located on non-TCP/IP-based systems — in particular the IBM and compatible mainframes and large AS/400 systems that still dominate the business-critical data centers of over 20,000 mid- to large-scale U.S. commercial enterprises.

In such enterprises, over 70% of the vital corporate data resides within the traditional data center as opposed to on the web servers hosting their nascent intranets. The data center systems, though increasingly supporting and integrating TCP/IP, will be running mission-critical SNA applications well past the year 2000. Enterprises that currently have data centers have no choice but to somehow integrate their new intranets and Internet interfaces with the SNA-centric systems, applications, files and databases that reside within the data center.

Taught by SNA-Internet integration expert Anura Gurugé, *Integrating Intranets and Data Centers* will help network managers, planners/designers, data center managers, systems programmers and database managers navigate the intricate issues surrounding the integration of data centers with intranets and the Internet.

If your organization has mainframes or AS/400s and are in process of implementing or have already implemented an intranet or an Internet gateway to your information repositories — this seminar is for you. *Integrating Intranets and Data Centers* will provide you with incisive, credible and comprehensive information so you can identify, evaluate and implement intranet-to-data center integration solutions in your organization.

6 Key Benefits of Attending:

1. Learn about available technologies for integrating data centers with intranets and the Internet including: browser-based access to SNA; tn3270E/tn5250; Data Link Switching (DLSw); application specific gateways (e.g., CICS Internet Gateway); programmatic access to applications and databases, and middleware.
2. Gain key insights on utilizing Java and JavaBeans technology for data center integration.
3. Explore various options for rejuvenating the dated 3270 user interfaces of SNA/APPN mission-critical applications without having to modify the mainframe or AS/400 resident applications.
4. Understand the network management implications of an Internet technology-based network that sustains mission-critical SNA/APPN applications.
5. Learn about the major data center-to-intranet/Internet integration solutions being offered by leading vendors.
6. Seminar presenter will illustrate all key technologies, including session, invocation and user interface rejuvenation via live, mainframe connected demo using market leading software products.

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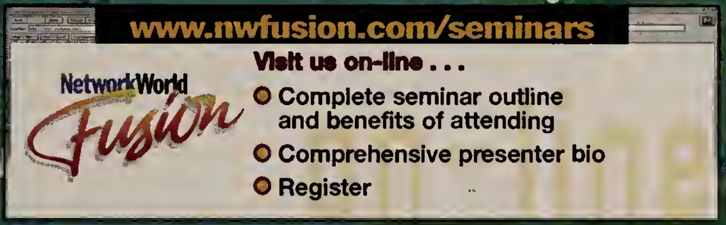

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PACKETSHAPER 2000 TOPS PACK OF FOUR PRODUCTS THAT GIVE YOU CONTROL OVER LAN-TO-WAN TRAFFIC FLOWS.

Packeteer is best at helping you get priorities straight

By Joel Snyder

LAN speeds are heading higher. WAN speeds are still poking along. So what happens when you connect a 100M bit/sec LAN to a 1.5M bit/sec T-1 line? Contention, congestion and frustration.

Packeteer *packs top performance and sophisticated management into its PacketShaper products.*

Enter bandwidth management products. These devices, sometimes called packet shapers, generally look like Ethernet bridges to a network manager. They have two Ethernet ports and act as gatekeepers between LANs and WANs, throttling network traffic to match the policies you establish. Bandwidth managers work almost exclusively on TCP/IP traffic; non-IP traffic is dropped or passed through unchanged. If the bandwidth manager does its job correctly, applications don't even know it's there, and routing and monitoring don't have to change.

We looked at four products designed to help manage the funnel between a high-speed LAN and a low-speed WAN. Packeteer, Inc.'s PacketShaper 2000 came out the clear winner on almost all fronts. With high performance, extreme flexibility and support for a broad range of traffic types and protocols, the PacketShaper can only be faulted for an overly complex user interface and a high price tag.

For those who don't need all the traffic characterization flexibility of the Packeteer box, Structured Internetworks, Inc.'s IPath/10M may be the answer. IPath's overall score was lower than PacketShaper's because IPath doesn't have as many packet prioritization options — but its performance was as good as PacketShaper's and its price is lower.

The other two products trailed in performance. Aponet, Inc.'s Aponet Bandwidth-Manager lacked the classification and bandwidth management features of the protocol-knowledgeable hardware from Packeteer and Structured Internetworks. SunSoft, Inc.'s Sun Bandwidth Allocator doesn't know protocols either, and the added complication of a Solaris platform drives up cost and installation complexity.

Performance and traffic management

Traffic-shaping is designed to improve network efficiency, so in order for these devices to do their job properly, they can't add overhead. Two of the four we looked at excel at their intended task.

PacketShaper and IPath know about the internal structure of the TCP protocol. They dig into packets to restrict traffic for each TCP connection without causing unnecessary retransmissions. We saw very little latency introduced by either device. The IPath passed all packets it saw, even those not destined for the router on the other side. This means that for the best performance you should put IPath on a switch port next to the router, so it sees only the packets already destined to go to the router.

For the simple network we built, Sun Bandwidth Allocator performed well, but it and Aponet Bandwidth-Manager don't know anything about the protocols they're managing. By simply dropping packets when congestion occurs, they bring out the worst in TCP. Senders must retransmit packets, wasting LAN, WAN and CPU resources. Receivers must retransmit acknowledgments, wasting resources in the other direction.

As an example of the problem, in a single-stream case, Aponet Bandwidth-Manager wasted 7.5% of WAN traffic by causing clients to retransmit TCP data packets, while servers sent 100 times the normal level of duplicate acknowledgment packets. In all, we saw lost WAN capacity between 6% and 18%, depending on the test configuration.

After performance, the most important features to look for in a bandwidth management product are robust traffic-shaping features. Packeteer offers the most sophisticated set of traffic classification and control features we've seen. Packeteer lets you prioritize IP traffic by the common classifications of IP address, subnet and TCP or User Datagram

Score Card

	Performance (25%)	Classification tools (25%)	Bandwidth management tools (25%)	Monitoring tools (15%)	Installation (5%)	Documentation (5%)	Total score
PacketShaper 2000	7 x .25 = 1.75	9 x .25 = 2.25	9 x .25 = 2.25	6 x .15 = 0.90	8 x .05= 0.40	9 x .05 = 0.45	8.00
IPath/10M	7 x .25 = 1.75	6 x .25 = 1.50	6 x .25 = 1.50	4 x .15 = 0.60	8 x .05 = 0.40	7 x .05 = 0.35	6.10
Sun Bandwidth Allocator	4 x .25 = 1.00	6 x .25 = 1.50	7 x .25 = 1.75	4 x .15 = 0.60	5 x .05 = 0.25	7 x .05 = 0.35	5.45
Aponet Bandwidth-Manager	4 x .25 = 1.00	4 x .25 = 1.00	6 x .25 = 1.50	6 x .15 = 0.90	8 x .05 = 0.40	5 x .05 = 0.25	5.05

Individual category scores are based on a scale of 1–10. **Percentages** are the weight given each category in determining the **total score.**

Protocol (UDP) application. It also lets you manage non-IP protocols IPX, AppleTalk, SNA, DECnet and NetBIOS. On top of that, you can set characteristics for traffic by URL (for example, you can treat GIF files differently from HTML files), by estimated speed of the client, by direction and by options in the IP packet header.

Once you've classified your traffic, Packeteer again offers a veritable feast of options. You can guarantee minimum bandwidth with a maximum burst capacity, choose a priority-based approach or simply discard packets. For incoming HTTP traffic, you can handle clients running at various bandwidths differently, such as redirecting traffic streams that are above or below a given speed to a different server. And you can decide what to do when a new connection comes in that cannot be guaranteed its minimum bandwidth: reject it or try to squeeze it in.

IPath is primarily aimed at IP traffic, specifically TCP/IP traffic, and has limited support for controlling bandwidth of non-IP traffic. Nevertheless, IPath has a strong and flexible traffic classification and management system. Traffic is divided into groups, which may contain individual IP-based hosts or entire IP subnets. Within each group, traffic may be further subdivided and controlled based on protocol-specific information, including TCP or UDP port number, protocol type and direction of traffic (in, out or both). Thus, it's fairly easy to limit HTTP traffic on one host and File Transfer Protocol traffic on another, yet reserve enough headroom on the network to let Domain Name System traffic get as much bandwidth as it needs.

Once you classify and sort your traffic, IPath offers you the option of specifying minimum bandwidth reservation (primarily useful during network congestion) as well as maximum bandwidth limits (useful when there is no congestion). The IPath also has a spot for "everything else," and you can set the minimum bandwidth available to these services under congestion (minima) and the maximum bandwidth available in the absence of congestion (maxima).

Sun's traffic classification tools are simple. Sun Bandwidth Allocator can explicitly manage only TCP and UDP traffic; other IP packets fall into a default group. Packets are classified by source and destination address (including a subnet mask, if appropriate), source and destination TCP/UDP application port number, and protocol (TCP, UDP or any).

That's the simple part; next, you've got to figure out what to do with the packets. Sun Bandwidth Allocator doesn't make this easy. Sun uses a hierarchy of classes; each class has a minimum and maximum bandwidth as well as a priority.

The hierarchy is important to Sun Bandwidth Allocator because it defines how classes are allowed to borrow and lend bandwidth amongst themselves — an important, but confusing issue when combined with the priority scheme. We tried to get fancy and use a combination of minima, maxima and priorities when doing our tests, but there were too many variables and the results were too unpredictable. We ended up setting all traffic to the same priority in order to make sure we knew what throughput we were going to get. It's not clear that Sun knows how to handle hierarchies either: We went through a tutorial of a hypothetical network linking London, Paris and Bonn, Germany, a half-dozen times, and we never did figure out what the exact results were going to be.

IPath *showed excellent performance, but its graphing tool was missing in action.*

Configuring Aponet Bandwidth-Manager is simple: network traffic is classified by IP address, or range of IP addresses, period. Anything Aponet Bandwidth-Manager doesn't recognize, such as non-IP traffic, it simply passes through. Once a traffic class is created, you assign input and output bandwidth limits, and that's it. You've done your management; you can go home now. However, this simplicity means Aponet Bandwidth-Manager lacks the flexibility of products such as PacketShaper and IPath.

Monitoring and reporting

Most of the vendors provide tools for checking on their products' performance. PacketShaper's PolicyConsole has a monitoring and graphing interface, but we found it difficult to get a quick overview of the network that way. You can easily fetch specific graphs for a particular traffic class, but you can't see the whole status of the network at a glance. And when you do look at usage data, PolicyConsole makes you beg for it, one little graph at a time.

IPath's weakest point is the monitoring software: it's not available yet, at least on Windows NT. Although Structured Internetworks' documentation and product information discuss a graphing analysis tool based on Tobias Oetiker's excellent freeware Multi Router Traffic Grapher

How to make them work efficiently for you

Once bandwidth management hardware is in place, you must divide traffic into classes, typically by IP address or TCP/IP application-level port number, although the classification schemes vary widely from product to product. Then you tell the bandwidth manager how much of the WAN traffic each class gets. Each product has different capabilities, ranging from assigning a simple raw number (for example, "The Web server gets no more than 512K bit/sec") to more complex rules involving setting priorities and minimum and maximum amounts of traffic the device can pass.

Properly done, bandwidth management can be quite complex. Throttling back applications efficiently requires an in-depth knowledge of the entire protocol stack being used. For example, an application running over TCP may have internal retransmissions if packets are lost or delayed. TCP has a whole series of internal timers and buffer interactions that vary from implementation to implementation, and IP and Ethernet have their own sensitivities. Taken together, the simple-minded approach of "drop packets when limits are reached" can have the effect of wasting WAN bandwidth, as well as skyrocketing LAN traffic and protocol stack CPU time.

Handling TCP traffic correctly means not only passing packets back and forth but looking deep into them. By delaying some packets, both sides of each TCP connection can be fooled into thinking that there is a long delay, which reduces retransmissions and overhead while letting the bandwidth manager efficiently throttle traffic.

Net Results

	PROS	CONS
PacketShaper 2000 NetworkWorld Blue Ribbon *Packeteer, Inc.* *(408) 873-4400* *www.packeteer.com* *Price as tested: $7,250*	▲ Powerful classification and policy tools ▲ Extensive documentation ▲ Intelligently handles TCP	▼ Complex to configure ▼ Monitoring summary information poor
IPath/10M *Structured Internetworks, Inc.* *(408) 467-0880* *www.thestructure.com* *Price as tested: $4,800*	▲ Simple management tools ▲ Good performance ▲ Easy to use ▲ Intelligently handles TCP	▼ Monitoring summary information missing
Sun Bandwidth Allocator *SunSoft, Inc.* *(415) 960-1300* *www.sun.com/software/* *Price: $4,995*	▲ Works well in sites with existing Solaris systems ▲ Simple classification tools ▲ Offers minima, maxima and priorities for traffic	▼ Lacks knowledge of TCP ▼ Poor performance in some situations
Aponet Bandwidth-Manager *Aponet, Inc.* *(408) 436-6550* *www.aponet.com* *Price as tested: $4,950*	▲ Simple to manage	▼ Few management options ▼ Poor performance in some situations ▼ Lacks knowledge of TCP

(MRTG), the version we evaluated had the IPath Profiler grayed out.

IPath does include a real-time monitoring tool in the configuration utility that shows instantaneous packet counts and traffic levels, but the documentation never explains (and we never figured out) what some of the counts mean.

Sun Bandwidth Allocator lacks comprehensive real-time monitoring, although statistics can be retrieved using SNMP.

Aponet Bandwidth-Manager hardware is constantly queried by the ABM System Administration application for throughput information. Every 5 minutes, the System Administration tool builds a new set of throughput graphs using the same MRTG software as the IPath, breaking down traffic by class and showing bandwidth consumed across various time spans.

Go online for a feature on bandwidth management and the World Wide Web.

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Installation and configuration

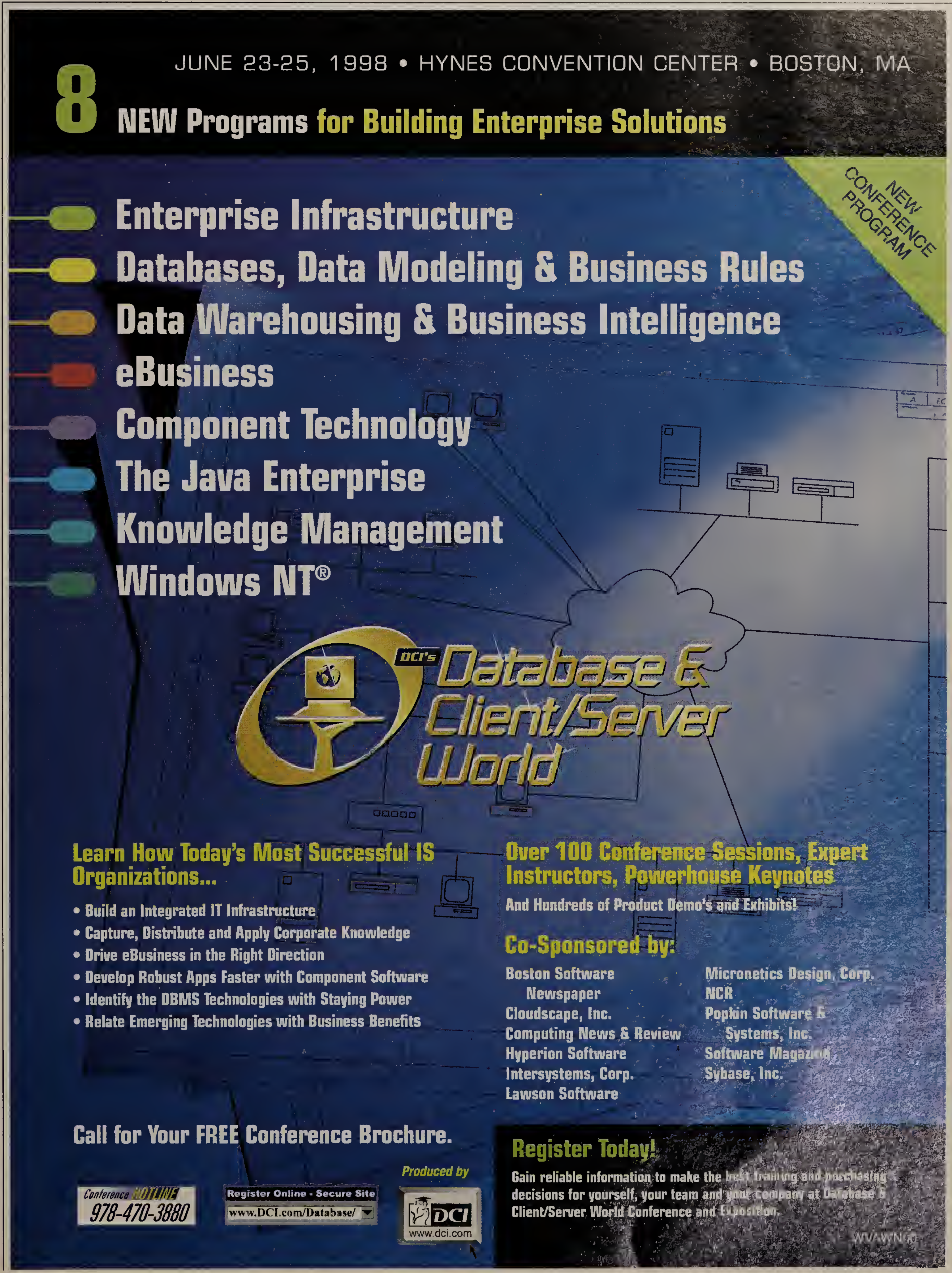
Packeteer's PacketShaper, Structured Internetworks' IPath, and Aponet Bandwidth-Manager are all two-port bandwidth managers you install between the LAN and the Internet access router. The PacketShaper comes in three flavors: PacketShaper 2000 (our test unit) for T-1 connections; PacketShaper 4000 for T-3 lines; and PacketShaper 1000 for 384K bit/sec connections. The IPath product line includes a 100M bit/sec version as well as four-channel models. We tested Aponet Bandwidth-Manager Model 100; a 10M bit/sec model is also available.

Aponet Bandwidth-Manager *compared poorly to the other products in performance, traffic classification and documentation.*

Sun Bandwidth Allocator is a software application that runs on the Solaris operating system on either SPARC or Intel Corp. hardware. We tested on a Sun Ultra 1/170e. Installing and configuring Sun Bandwidth Allocator is easy for a Solaris-literate network manager; if you're not familiar with Solaris, however, you probably won't want to tackle it. You can also configure Sun Bandwidth Allocator to look more like a traditional router, with IP addresses on both LAN interfaces.

While PacketShaper and IPath have a command-line interface, and Sun lets you edit text files to change configuration, we used each vendor's graphical management applications to configure the devices: Packeteer's PolicyConsole, which runs under Netscape Communications Corp.'s Navigator; Structured Internetworks' IPath Manager, which runs under Windows or Solaris; Sun's Solaris-based tool; and Aponet's ABM System Administration, which runs on either Linux or Windows NT.

PacketShaper gives you more knobs, buttons and sliders than all the other products put together, and all those controls are confusing. The manual is 263 pages long. PacketShaper was the only product for which we needed technical support to configure properly. At the other end of the documentation spectrum is Aponet, which provides only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online documentation — no hard copy manuals are included.

Last words

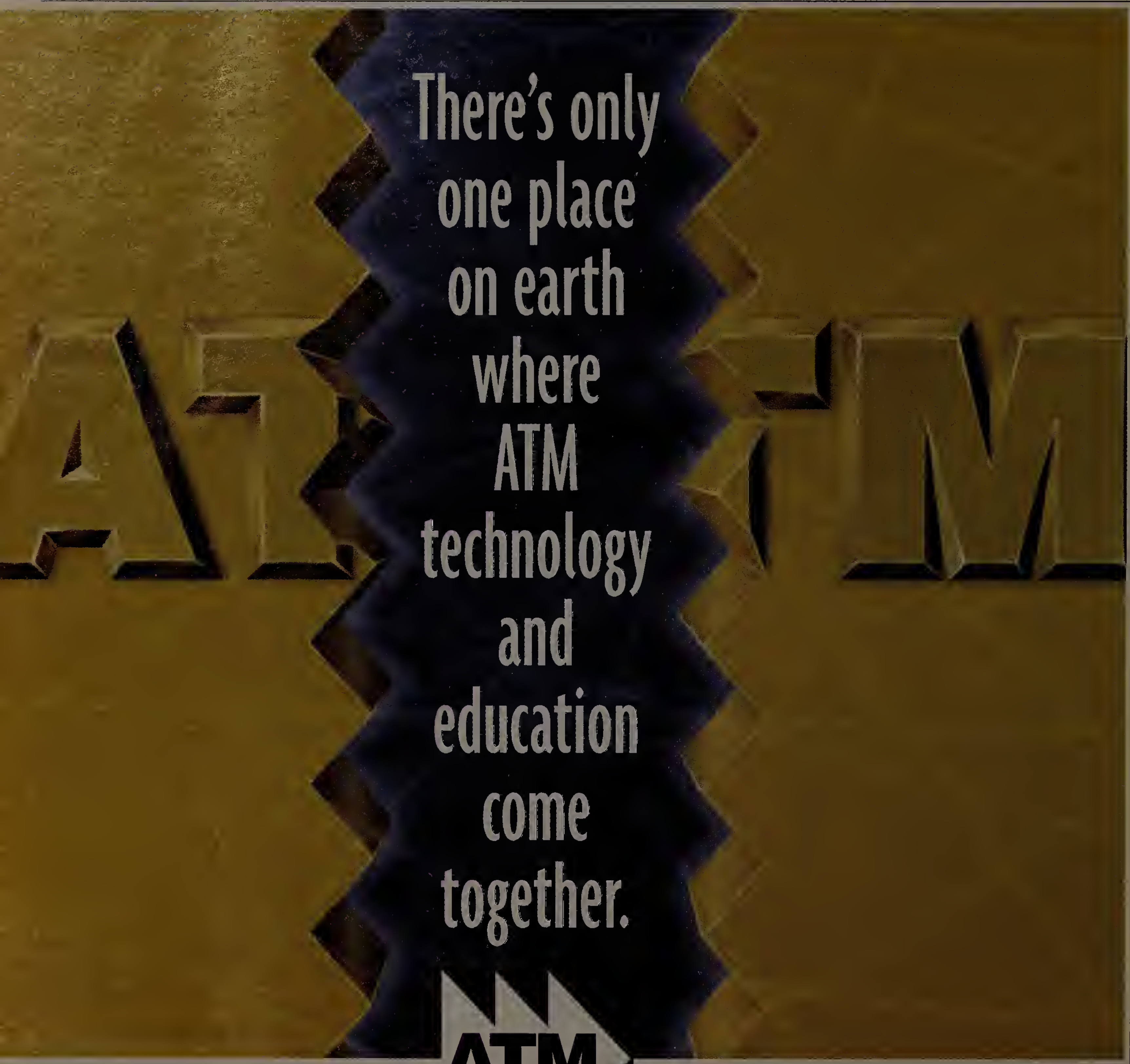
In the final analysis, one product stood out for its powerful capabilities and efficient performance. PacketShaper is for the network manager who needs to micromanage packet flow. Its multiple levels of traffic classification, IP and non-IP support, and traffic management policies and actions, go further than any other product in the market.

Assuming that Structured Internetworks gets its act together on the monitoring side, the IPath is a good, solid product. The company has an innovative pricing strategy, with prices tiered based on factors including bandwidth passing through the IPath and the total number of IP addresses and subnets. At a reasonable price point, it combines the elegance of protocol-specific bandwidth management with a simple interface and no-questions-asked performance. IPath isn't fancy, but it works great.

While the Sun product is solid, it will be of primary interest to existing Solaris sites. Unless you've got excess Sun servers littering your computer room, dedicated hardware is a better choice.

Aponet's simplicity in configuration may be appropriate for some networks, but the performance loss caused by TCP's retransmission algorithms is a limiting factor.

Snyder is a senior partner at Opus One, in Tucson, Ariz., where he specializes in networks and communication systems. He can be reached at jms@opus.com.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How We Did It

Most of these vendors told us their products were designed to operate in a LAN-WAN environment, so we built a 100M bit/sec test bed with 20 clients and 20 servers, and two multiprotocol routers separated by a 1M bit/sec or 2M bit/sec link. The routers were attached to a 10M/100M switch. We also attached this test bed network to our production LAN so that a generous amount of non-IP traffic, including DECnet and AppleTalk, would also be present. After running baseline control tests, we put each bandwidth manager in the configuration between the client-side LAN switch and the router.

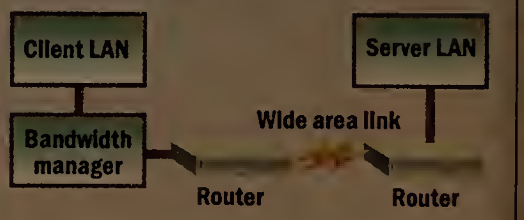
Before starting our tests, we tried a simple configuration to see how much latency and inefficiency is introduced by the bandwidth manager hardware when it's just passing packets.

We left the systems up for 24 hours to let any memory leaks or other bugs manifest themselves, then started performance testing. We ran 12 different throughput tests with TCP and UDP traffic to see how the bandwidth managers behaved under different kinds of loads and configurations.

The heavy-load test had 20 clients simultaneously pushing TCP-based traffic to the 20 servers. The traffic had characteristics typical of Web data transfers. Heavy-load clients fell into several bandwidth classes; together, they would fill the entire link. Without a bandwidth manager, the heavy load would cause extreme congestion. We selected these traffic characteristics to show the greatest variation between the products.

In the light-load test, a single client sends the same stream of TCP traffic as in the heavy-load test, but to a single server.

TEST CONFIGURATION



PROGNOSTICATORS POINT TO THE REMOTE ACCESS TECHNOLOGIES THAT WILL BEST MEET YOUR NEEDS.

Remote access 1999

By Arielle Emmett

In 1999, American road warriors will connect to enterprise networks using wireless links that provide bandwidth-on-demand more economically than wireline connections. Counterparts in small offices will fire up asymmetric digital subscriber line (ADSL) connections, linking them to the corporate LAN at T-1 speed upstream and 6M bit/sec downstream. National carriers and local Internet service providers will offer virtual private networks (VPN) — enhanced Internet-based data backbones tying together corporate workgroups on far-flung LANs. Between larger branch offices, public frame relay will continue to rule.

CHARLIE HILL

Welcome to the dizzying world of corporate remote access.

Your access options are already varied, but they're going to get even more so in the coming year. The choices include 56K bit/sec modems, wireless IP telephony, ADSL, cable modems and secure VPNs, to name a few. Add to that stalwarts such as frame relay and you've got a veritable remote access cacophony.

To find out which options have the best chance of meeting your myriad long-term requirements, we polled analysts, users, service providers and vendors. Though no scenario is cut and dry, their responses point to certain clear trends.

The Internet will play a much greater role in providing a wide-area alternative for corporations seeking to outsource all or part of their remote access network. Tunneling protocols, security and quality of service (QoS)-like guarantees will dominate the "premium" Internet — a highway supporting different classes of service. In addition, corporate managers will see lower cost access routers, streamlined IP addressing and the transformation of core service provider networks from analog to digital.

It all amounts to a push toward less expensive Internet-enabled access technology, with many ways to tap in, including wireless, cable modems and xDSL.

For high capacity — frame relay

At the high end of the remote access requirement ladder is the need to tie larger branch offices into the corporate net. Here it appears frame relay will reign supreme.

Telco Systems, Inc., a Norwood, Mass.-based maker of integrated access devices for public carriers, uses a hybrid of public and private frame relay and dial-in access for its remote corporate users, according to Anand Prikah, vice president of marketing and business development. "If you have 10 people in a branch office, you'd want to have frame relay access for data as opposed to a leased line or modem connection because of two factors: cost and performance," Prikah says.

Using multiple modem lines will yield unpredictable and often poor response times, along with high distance-based costs, Prikah says. But users can employ frame relay to fashion what, in effect, are VPNs. For example, Telco Systems uses a carrier's fractional T-1 service to get six DS-0s of bandwidth, but attaches its own frame relay access devices (FRAD). "It's a true hybrid of public and private frame relay," Prikah says. "It's cheaper for us to do it this way than to go for a full T-1 on a public frame relay service."

By 1999, corporations looking for multiple levels of priority and QoS may migrate to some level of ATM and frame relay interworking, says Inbar Lasser-Raab, a director of product management for RAD Data Communications, Inc. interexchange carriers, for example, are looking at ATM/frame relay interworking to satisfy complex access requirements for institutions with many branch offices, such as banks and retail companies.

The VPN boom

In the meantime, branch office connectivity to the Internet is becoming hotter, as vendors make it easier to accomplish, Lasser-Raab says. For example, small to midsize branch offices can access a wide-area IP backbone using a fractional T-1 access router that has an integral DSU/CSU and a firewall, such as the Rad Web Ranger II-T-1. As a result, remote access customers can take advantage of ISP-based network services — including enhanced e-mail, Web access and enterprise LAN connectivity.

"Enterprises now use the Internet as a WAN, a vehicle to provide remote access to teleworkers, after-hours workers, remote offices and traveling employees," says Eric Bocish, director of core network services at US WEST's !nterprise group. "The big question still is, 'How do I keep my traffic safe?' "

The big answer is VPNs, a portion of the 'Net that users carve out and call their own. Indeed, this is one of the options generating the most excitement in remote access circles.

Many ISP- and carrier-based VPNs are in the early stages of development, so their availability can't be considered a certainty. Nonetheless, they do seem to be the best bet for achieving different classes of IP backbone services.

"VPNs provide connectivity within a closed user group, offering directories, security, authentication, even content," says Liza Henderson, a broadband consultant with TeleChoice, Inc., of Verona, N.J. With continued improvement in security protocols, some companies, generally smaller ones, are ready to outsource remote access nets entirely to public VPN service providers.

However, Bocish notes that "a large enterprise customer with an IT staff will want to maintain a level of control using our network transport products to construct their own VPNs."

You can access a VPN in any number of ways, including dial-up analog, ISDN, DSL, a FRAD, an IP router or cable modem. "In the case of a packet-switched service like frame relay, for example, those packets are isolated from other traffic, yet placed on the public switched infrastructure," Bocish says.

The main incentives for using an ISP backbone are the cost, ubiquity and availability of Internet ports, says John Coons, director and principal analyst for Internet Infrastructure at Dataquest, a Gartner Group, Inc. company. "But the secret of VPN access is to address the issues the enterprise would have in moving to the Internet," he says. Those issues come down to security and QoS guarantees.

To tackle the security issue, VPN providers such as AT&T WorldNet offer secure encryption and firewalls. They also may throw in private vanity addresses that include a company's name and other unique identifying information.

But Coons says it will take service-level agreements between users and their carriers or ISPs to address QoS issues. These issues include availability, reliability and performance in terms of throughput, delay and packet loss.

Carriers are addressing these matters. Concentric Network Corp., an ISP in Cupertino, Calif., is now offering money-back guarantees that latency across its network won't exceed 125 msec, a real draw for enterprises concerned with fast access and network performance.

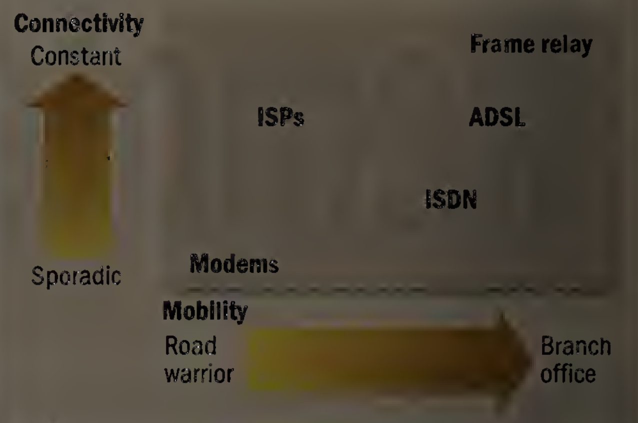
"Concentric runs on an ATM backbone and built its network originally to address Internet multiuser gaming, where latency is an issue," Coons says. "I don't know of any other carrier in the business ready to rat on itself by reimbursing customers for lost performance."

ISPs also are looking to offer different tiers of VPN service, says Hilary Mine, senior vice president of Probe Research, Inc. Using technology such as the Resource Reservation Protocol, designed to reserve bandwidth on a net, and additional tunneling protocols for security (see story, page 43), carriers can offer QoS-type services and carve out secure channels to boost performance, she says.

"We see ISPs charging higher fees per port when they offer premium service or guarantee lower numbers of users per port," Mine says. For example, UUNET Technologies, Inc. sells premium dial access. "You can also see this for AT&T WorldNet and others — the ones that are catering to business users to differentiate themselves," she added.

MAPPING THE OPTIONS

Analyst Steven Taylor has a simple chart to help you determine where various access technologies best fit given varying connectivity and mobility requirements.



SOURCE: Distributed Networking Associates, Greensboro, N.C.

DSL for power telecommuters

The options for reaching the corporate server via IP nets vary widely. Aside from standard analog access, ISDN and frame relay, some analysts are betting that various flavors of DSL will become viable options. xDSL will be an especially good fit for power telecommuters, including engineers, financial analysts and anyone with large files and a need to tap into corporate LAN servers at multi-

A RUNDOWN OF THE ACCESS OPTIONS

Access method	Target audience/comments	Pros	Cons	Prognosis
Frame relay	Ideal for branch offices with 10 or more people that have high-volume data needs – 56K, fractional T-1 or full T-1. Public frame relay is less expensive than private dedicated frame relay at T-1 speeds. For fractional T-1 requirements, users may lease DS-0s from public service provider.	● Highly scalable ● Dial-up FRADs available ● 56K to 256K bit/sec without changing equipment ● Not distance sensitive ● Security available ● Lower cost per bit than dedicated access ● Voice over frame relay available ● Easy migration from leased lines	● CPE more expensive than analog dial-up and some ISDN equipment ● Quality of voice over frame relay still needs improvement	Excellent – good long-term choice
xDSL	Telecommuters; small businesses requiring more bandwidth; branch offices; power users. Asymmetric flavor offers speeds up to 8M downstream; symmetric DSL deployed currently at 768K bit/sec.	● Scalable ● Available through existing copper infrastructure ● More bandwidth than ISDN ● Cost per bit could become lower than ISDN	● Limited availability at this time ● Pricing still high	Promising
Cable modems	Individual telecommuters; branch offices (up to 25 users)	● High bandwidth ● Affordable – cost per bit lower than many other remote access methods	● Availability, especially in commercial areas ● Degradation of performance with many users ● Security ● CPE more expensive than analog modems	Questionable for corporate use
56K bit/sec analog dial-up	Mobile and fixed users; telecommuters; branch offices with less than 10 people	● Affordable ● Ease of use ● Ubiquity ● Mobility – good for laptop users ● Less expensive than frame relay and ISDN CPE ● Security	● Local-loop infrastructure may not support speeds approaching 56K bit/sec	Good – will likely be a mainstay for lower end applications
ISDN BRI	Fixed users; telecommuters; small businesses	● Digital quality ● Widespread availability	● Bandwidth limited to 128K bit/sec ● Relatively high cost	Questionable – could be usurped by xDSL
T-1/Fractional T-1 access routers with dial-in capability and built-in firewalls	Small to midsize branch offices. Remote corporate users can dial in to corporate LANs via IP backbones, cross firewalls with appropriate access information, use Internet or intranets.	● Ideal for setup of VPNs ● Multiple protocol support and access options (PPP, frame relay, T-1, fractional T-1) ● Security ● Streamlined IP addressing – one LAN supporting up to 20 users can have a single IP address	● New to market; VPNs immature	Good – especially as VPNs mature
Wireless broadband – Local Multipoint Distribution Service	Corporate offices seeking bypass or alternative to landlines	● Range of bandwidth available – 56K to 1M bit/sec ● Less expensive than fiber	● Brand new; very limited availability ● Quality of transmission may degrade with line of site problems, inclement weather	Questionable – significant pricing and reliability hurdles to overcome
CDMA next generation	Mobile road warriors; telecommuters	● High bandwidth availability – 384K bit/sec ● Mobility ● Ubiquity	● Experimental; very limited availability ● Pricing uncertain	Questionable – has to be proven

SOURCES: HILARY MINE AND MIKE SMITH, PROBE RESEARCH; ANAND PRIKAH, TELCO SYSTEMS; IRA BRODSKY, DATACOMM RESEARCH.

megabit data rates.

"I can see ADSL running over copper wires to interconnect branch offices," says Steven Taylor, the principal of Distributed Networking Associates, a network consultancy in Greensboro, N.C. "Another option is to use ADSL as the access piece to connect to a local ISP; you'd have a fast link to the ISP from the corporate side and would be limited only by the capabilities of the ISP network."

Beth Gage, senior broadband consultant with TeleChoice, expects ADSL to roll out and be more widely used this year, and to really start becoming a viable option in 1999.

Before that happens, xDSL pricing will have to come down a bit. The services are now pricing out at $100 to $300 per month at moderate data rates, says Dataquest's Coons. That pricing isn't low enough to meet some users' requirements immediately, but pricing is expected to become more competitive.

Mike Lutz, a senior network and systems administrator with Intermec Technologies Corp.'s Norand Mobile Data Systems Division, a maker of wireless data communications equipment and software in Cedar Rapids, Iowa, says he has about 30 power users — people who could benefit from ADSL — sending 10M- to 20M-byte files back and forth from home to corporate servers. "In our area, ISDN costs over $80 per month — it's insane," Lutz says. "So if DSL came along and we could do it for $40 per month per user, we'd probably have engineers, finance and IS people using that for remote access from the home and leaving it up 24 hours a day."

Dean Heltemes, remote access service manager for Cargill Inc., a $60 billion commodities firm in Minneapolis, predicts xDSL will supplant ISDN for telecommuters when bandwidth requirements outstrip the existing ISDN 128K bit/sec data rate.

"Although ISDN is really doing it for us today, it won't be by 1999," Heltemes says. "I've read xDSL should be priced less expensively than ISDN and it's faster, so if xDSL is widely available, we'll go for it."

ISDN pricing is "insane" *in Mike Lutz's area, so DSL may be just the ticket for his 30 power users.*

MARK TADE

Lone warriors

For the more mobile laptop-toting road warriors, analog 56K bit/sec modem access is pretty much the rule today. However, one new twist has come along, with some modem vendors offering analog channel bonding, which enables you to tie two phone lines to get twice the bandwidth. The downside to the idea is you need two modems and two phone lines and you have to make two phone calls to an ISP. It also puts additional burdens on ISPs, which need more phone lines, modems and larger remote access concentrators to accommodate the increased user traffic.

Other interesting new options may be available for telecommuters by 1999. A new flavor of IS-95, the U.S. Code Division Multiple Access (CDMA) wireless standard, offers 384K bit/sec of bandwidth for data, paving the way for faster "third-generation" wireless connections between mobile workers and corporate nets.

Such a link has already been proven experimentally in Japan. NTT DoCoMo, the largest wireless carrier in Japan, is now scheduling deployment of a wideband CDMA multimedia network throughout the country.

Ira Brodsky, president of Datacomm Research Co., a Chesterfield, Mo., wireless consulting firm, believes the next generation of IS-95-based services, expected within the next two years, will make wireless access competitive with wireline in the U.S. as well.

"If you take 384K bit/sec data rates and an IP telephony solution in your laptop, you could download e-mail or share a document, or talk to another corporate worker who is mobile like yourself," Brodsky says. The principal benefit, aside from cost, is coverage and ubiquity. "What you're really comparing this to is a somewhat petrified wireline infrastructure that's been promising high speed for years," Brodsky adds. "A 3-G wireless system will provide ubiquitous high-speed access; clearly you want to use that on the road, maybe at home, or in the office."

Lone telecommuters and small branch offices also may be able to use cable modem technology, which zips data across the Internet at multimegabit speeds. Some cable modems can now reach speeds of 5M to 10M bit/sec, although most cable providers do not deploy at that level. The success of cable modem technology for the telecommuting population will depend on how aggressively cable companies move their outside plant to commercial zones — right now cable is almost exclusively residential.

TeleChoice's Gage says cable companies are already putting the moves on the commercial sector, citing US WEST's MediaOne Connect in the Los Angeles area as a prime example. "It's not a consumer-only product anymore," she says. If operators make use of available cable plant and are aggressive on pricing, "it could work," Gage says.

Dataquest's Coons thinks the price is right. "Some advertise around $45 per month for everything, including equipment lease, the ISP and Ethernet interface that plugs into your PC," he says.

Whichever access methods companies choose now, most analysts are betting that premium data highways built over the Internet will become increasingly important.

"The No. 1 change that's happening is an explosion of QoS and bandwidth requirements for services," says Tim McShane, director of marketing, remote access, at Cisco Systems, Inc. "People are getting on the 'Net and staying on, continuously using the lines that are open. That means big requirements for QoS and latency control, and a rich set of protocols to prioritize sessions on the 'Net."

Corporations will benefit from outsourcing portions of their nets and choosing access devices that can handle more sophisticated connectivity. In turn, McShane says, "ISPs are getting ready for where these services are going; they're making sure the infrastructure will scale appropriately."

Emmett is a freelance writer based in Wallingford, Pa. She can be reached at ArielleEm@aol.com.

Sorting through the tunneling protocols

Tunneling protocols are the keys to virtual private networks, especially secure VPNs that use the Internet for transport. The protocols are used to establish a secure path through which a given company's message or file will travel across the 'Net.

Two proprietary tunneling protocols are among those being used today to implement VPNs: the Point-to-Point Tunneling protocol (PPTP), an extension of the Internet PPP protocol originally sponsored by Microsoft Corp., and Cisco Systems, Inc.'s Layer 2 Forwarding (L2F) protocol.

Additionally, Ascend Communications, Inc., Cisco, Microsoft and 3Com Corp./U.S. Robotics are backing the Layer 2 Tunneling Protocol (L2TP), which is a hybrid of PPTP and L2F. The Internet Engineering Task Force (IETF) is developing L2TP as an industry standard.

L2TP is a link layer tunneling protocol with sophisticated capabilities, including virtual dial-up, which allows for encapsulation of non-IP protocols within IP. L2TP also allows for many users to share common access infrastructure, including modems, access servers and ISDN routers.

Internet service providers can use virtual dial-up to offer VPN services because the protocol enables them to establish separate tunnels for different customers. However, as is the case with PPTP, L2TP does not support its own encryption and authentication mechanisms, meaning the ISP and its customers have to address those issues separately.

Another protocol, IP Security (IPSec), is intended to overcome that limitation by offering X.509 digital certificate authentication and encryption. IPSec is being considered by the IETF for emerging financial applications on the 'Net, such as the safe transport of credit card information, says Andy Kaufman, president of AHK & Associates, Inc., a network integration firm in Schaumburg, Ill. The protocol, which is still being tested, can be used in conjunction with L2TP.

"For example, to design a system for financial transactions, you'd use L2TP as the pipe, and IPSec for your encryption and security," Kaufman says.

— Arielle Emmett

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6531

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- **Our Buyer's Guide to remote access server hardware: Good stuff if you've got high-end requirements**
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- **Our assessment of how well software-based remote access routers stand up against hardware-based models**

Closing the door on departures

GTE Internetworking knows how to hang on to its network operations staff.

By Mitzi Waltz

High-tech personnel are hard to find and retain, and the formula for building a successful and stable team can be elusive. It's certain, however, that GTE Internetworking is on to something. Only one employee has resigned from the Internet service provider's 43-person Network Operations Center (NOC) since November 1996, and that was because he was moving out of the country.

NOC Director Joe Leonard says there's no secret formula for his success, nor is there any one element he can point to as more important than another. Rather, he is more like a coach who succeeds by continually focusing on all the fundamentals. In this case, the fundamentals are hire carefully, promote internally, reward regularly and educate well.

"When we bring new recruits into our group, one of the things that's most important is how they're going to fit. It's even more important than technical knowledge," Leonard says. Team-oriented people who are smart and willing to learn can excel at GTE regardless of their background, he says.

Flexibility is one of the most important attributes Leonard looks for when he evaluates candidates. The ISP industry and the daily workload at GTE change rapidly. One day's crisis may be a downed T-1 line, while the next day, it's routing around multiple T-3 outages while pushing the telephone company to fix the problem.

Many applicants come to GTE with impressive backgrounds, but some may be reluctant to learn about new technologies or may resist adopting faster ways to perform familiar tasks, Leonard notes. Others have less experience but will thrive because they're willing to take the initiative, ask questions and learn.

For example, Michael Ruffini joined the ISP when he was fresh out of school with an English degree. He moved up rapidly from his entry-level trouble-shooter post to become a member of the network engineering team. As he puts it, "You can teach people how to fix a T-1, but you can't teach people how to think for themselves."

Leonard fosters an interdependent, casual atmosphere at the NOC, which employees say relieves some of the pressure. Co-workers are encouraged to help each other solve problems, and managers make a point of listening and responding to ideas from the rank and file. Pizza dinners and quarterly parties also contribute to building team spirit, Leonard says.

GTE Internetworking's *Joe Leonard does a good job motivating employees such as Kay Trepanier and Michael Ruffini to stick around.*

Upwardly mobile

Too often, network operations workers feel they're in a dead-end position and grab the first job offer that comes along, Leonard observes. That was the case at GTE, too, until the company recognized that some workers felt they had to leave in order to move up the career ladder.

With the career advancement structure in place, "people in our group see that there's a path from the NOC into an engineering group," Leonard says.

Rather than just talking about promoting from within, GTE makes it happen. "I have our managers sit down with people and lay out a career path. They may say 'I like what I'm doing, but two years down the road I'd like to be a project manager in your information services group.' We try to show them how to get there," he says.

GTE employees cite internal promotion as the biggest incentive for sticking around. The policy is important in an environment like the NOC, where both the work and the workplace can be stress-inducing. For the rows of network staffers watching wall screens, keeping an eye on network maps and answering frantic phone calls, it helps to know their jobs could grow into something bigger before too long.

"It's very fast-paced, very unpredictable, but that's the nature of working in the NOC," says Kay Trepanier, a network controller. "You never know what might happen next."

Luckily for Trepanier, her NOC days didn't last forever. She just moved into a newly created position as telecommunications analyst to leverage the experience she gained as a front-line trouble-shooter. Most employees in the NOC move to a better position within two years, Leonard says.

GTE's work atmosphere is different from Trepanier's former employer, a competing ISP. "It's the professionalism," she says, noting GTE's policies and procedures outlines.

That makes moving up easier, too, she says. Before she assumed her current position, Trepanier familiarized herself with the tasks for which she would be responsible. A telco guideline that includes step-by-step instructions also made her feel comfortable tackling the new job.

Internal promotions aren't the only incentive, of course. GTE's salaries are in line with other local firms, and include 10% to 15% differential pay for second- and third-shift workers. The company also offers a performance bonus program and standard benefits. Although such compensation packages are fairly common throughout the industry, frequent salary reviews help set GTE apart from the competition.

"Every quarter we review the employee's salary," Leonard says. Employees who learn extremely quickly are moved up in the company on a fast track.

Training for success

GTE also gives its employees the tools to learn. The company offers internal training for trouble-shooters on T-1, T-3, frame relay and TCP/IP issues, among other topics. These aren't just generic professional certification courses, but ones that are specific to GTE's network and procedures.

Employees who want or need certification can use self-study materials or take advantage of the company's generous tuition assistance program. Trepanier is completing a Unix certification program at nearby Northeastern University, in Boston, while others pursue Cisco Systems, Inc. certification or complete a degree.

While some employers are hesitant to fund training for fear of workers jumping ship with newly acquired skills, GTE's impressive retention rate shows that the benefit might even help instill employee loyalty.

Waltz is a freelance writer in Portland, Ore. She can be reached at infobahn@teleport.com.

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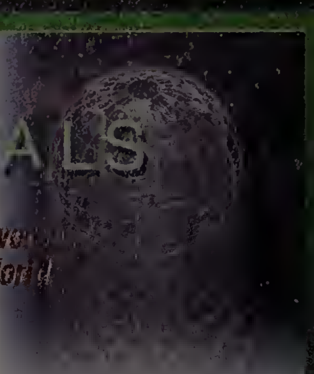

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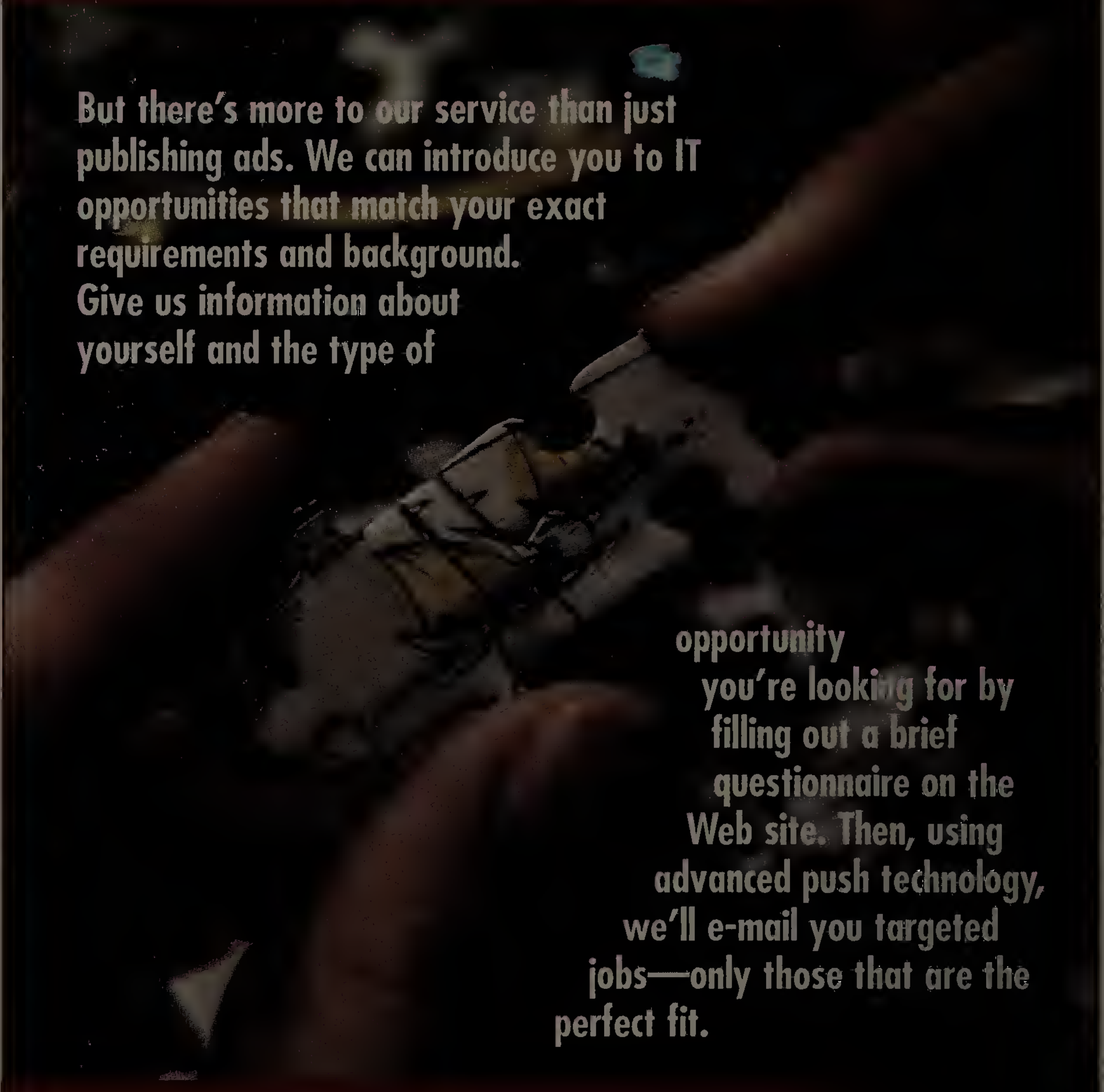

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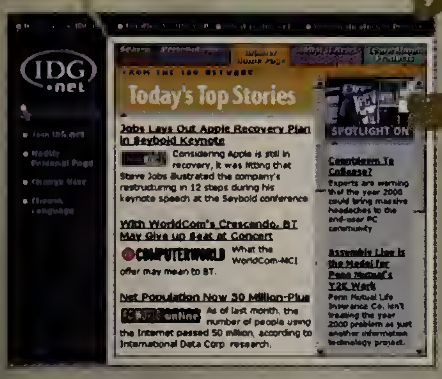

Jobs Lays Out Apple Recovery Plan in Seybold Keynote

Considering Apple is still in recovery, it was fitting that Steve Jobs illustrated the company's restructuring in 12 steps during his keynote speech at the Seybold conference

With WorldCom's Crescendo, BT May Give up Seat at Concert

What the WorldCom-MCI offer may mean to BT.

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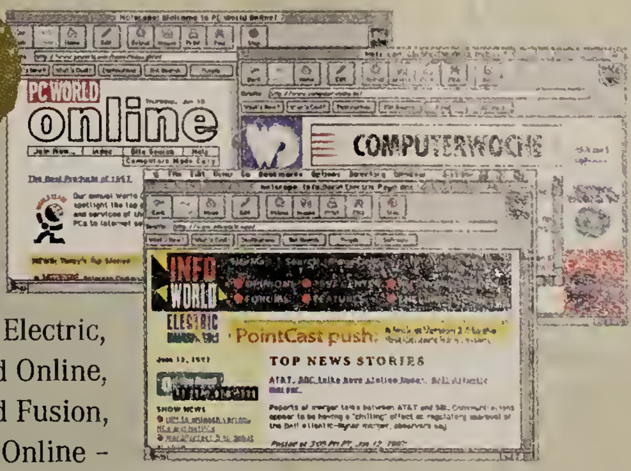

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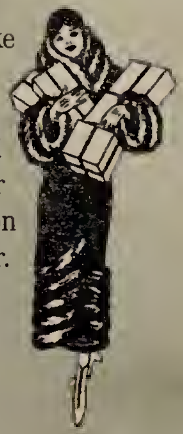

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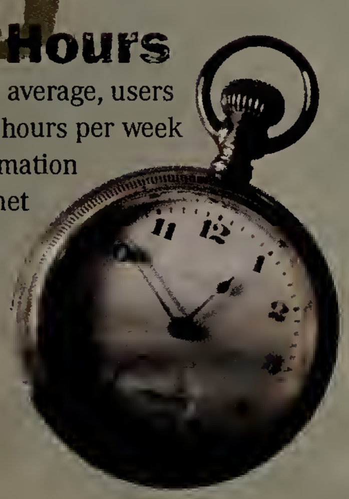

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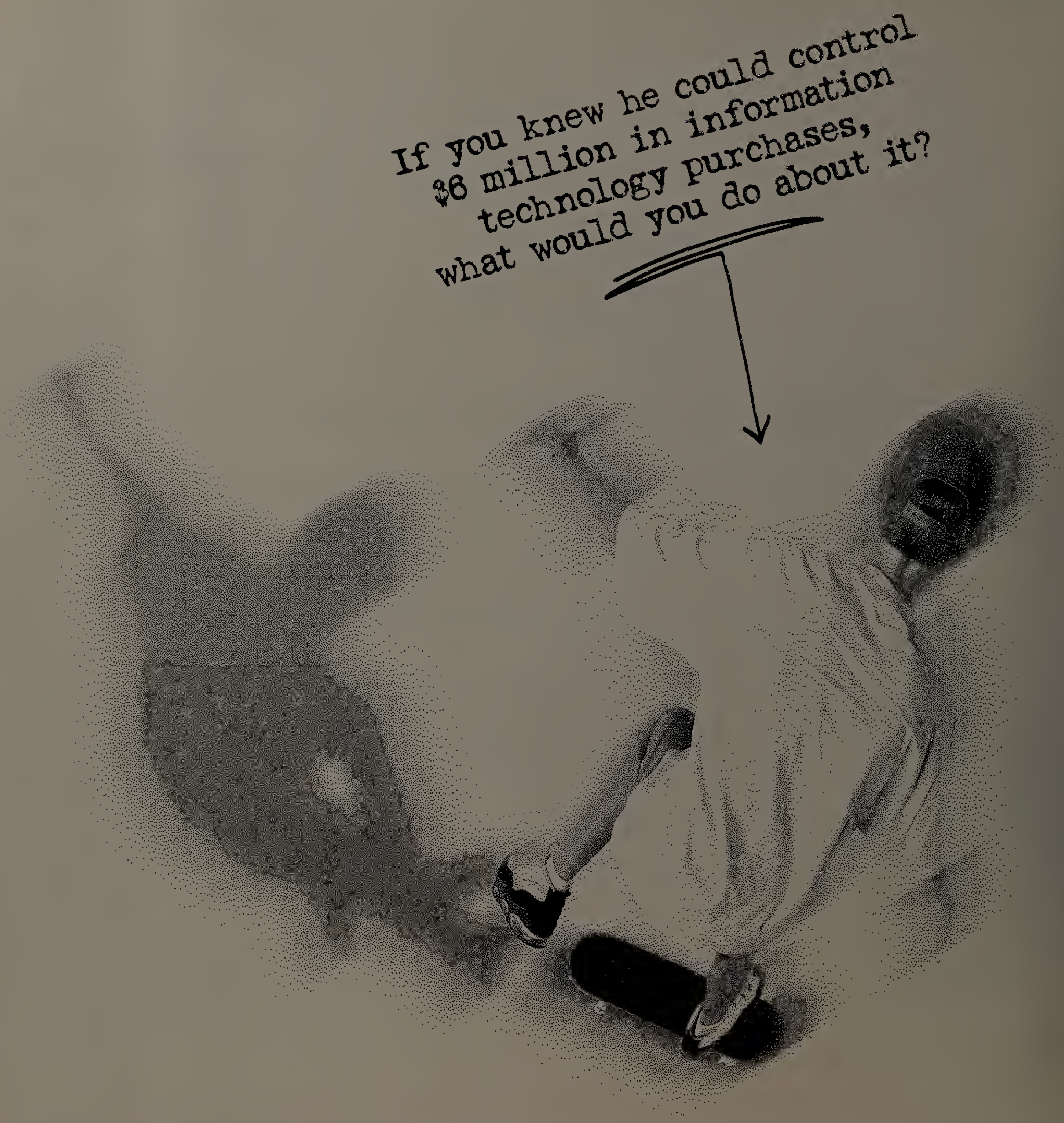
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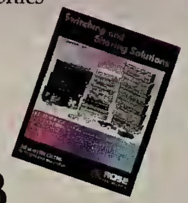

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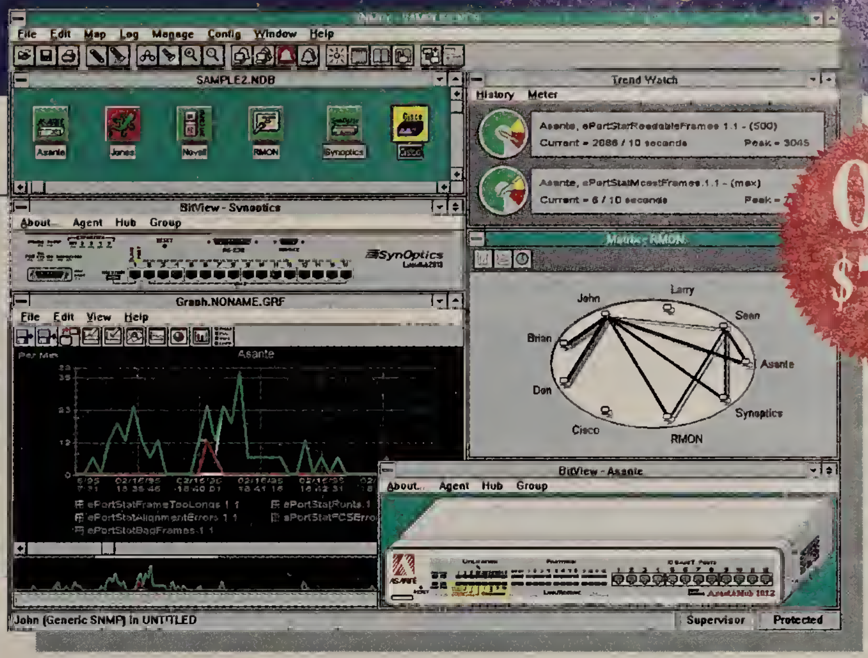

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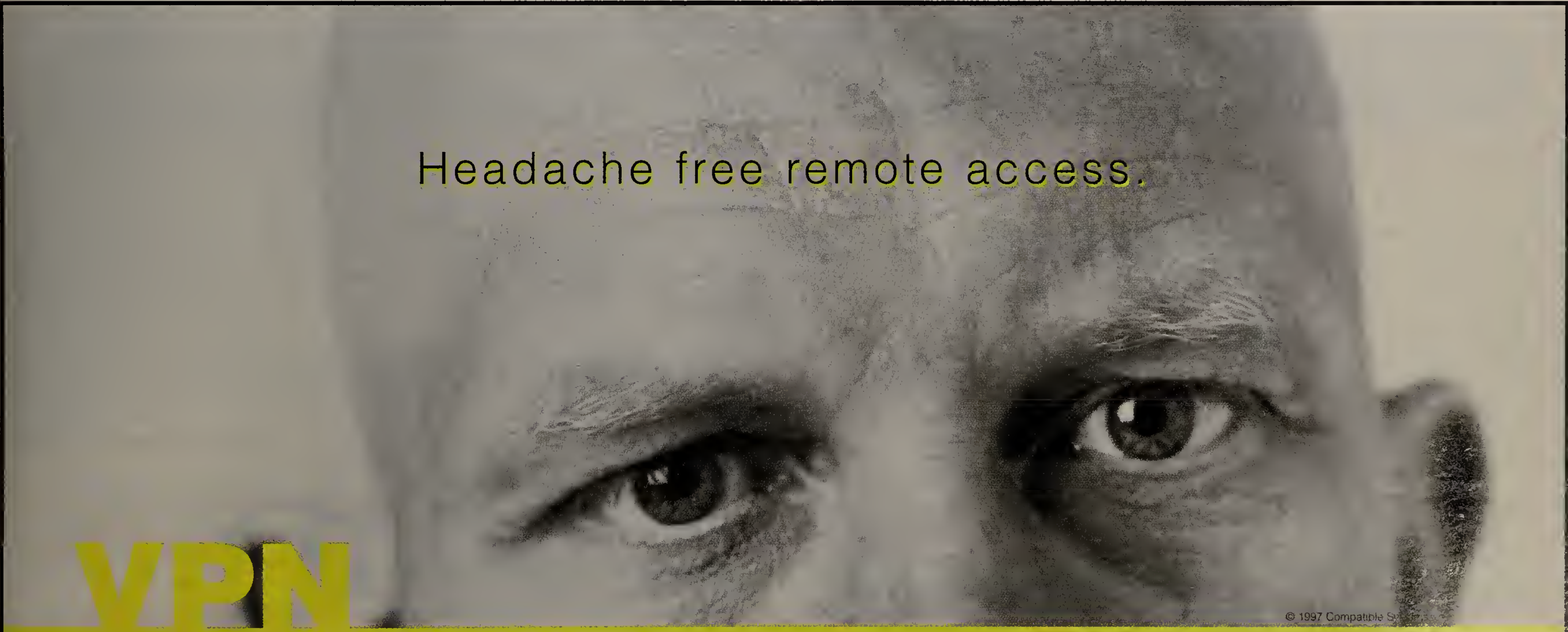

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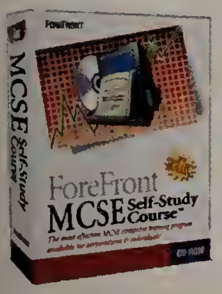

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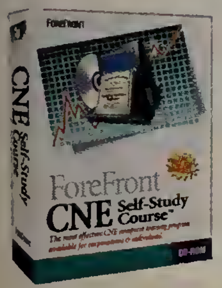

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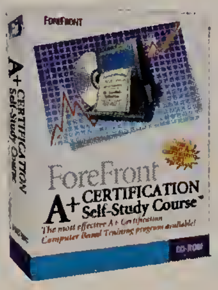
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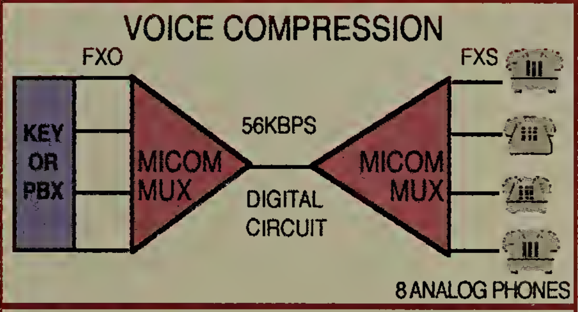

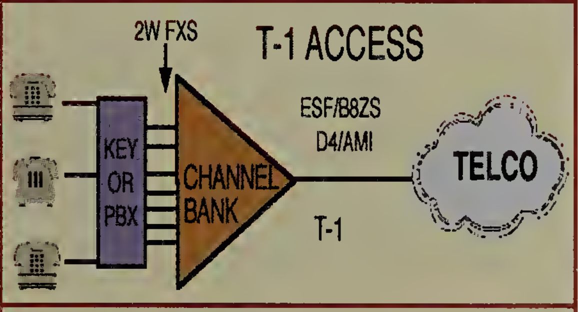

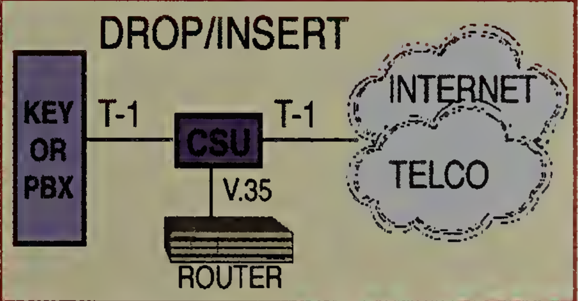

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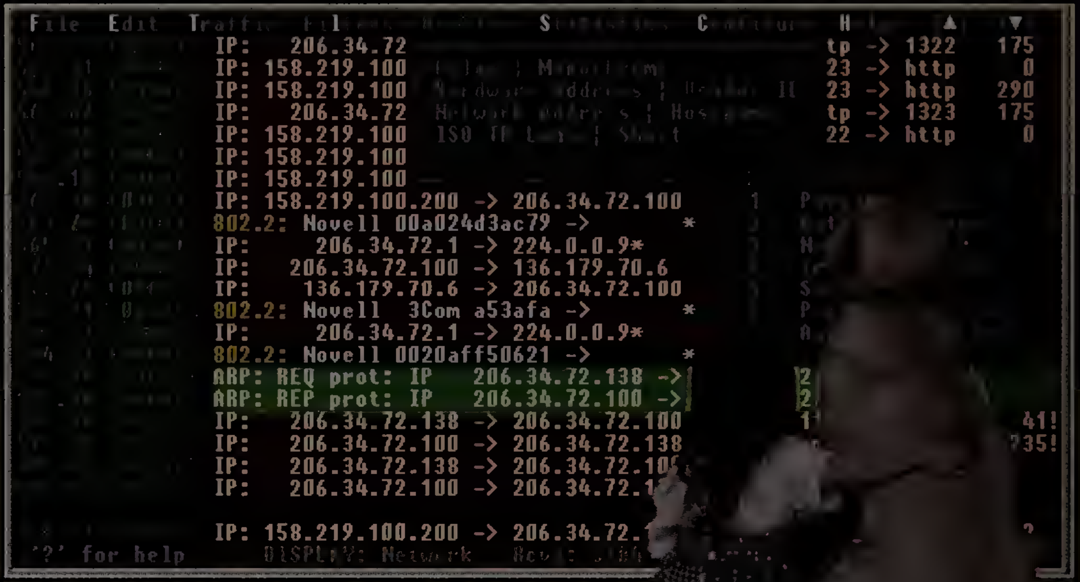

```
File  Edit  Traffic  Fil          Statistics  Configure  H       ▲     ▼
        IP:   206.34.72                                  tp -> 1322   175
        IP: 158.219.100                                  23 -> http     0
        IP: 158.219.100                                  23 -> http   290
        IP:   206.34.72                                  tp -> 1323   175
        IP: 158.219.100                                  22 -> http     0
        IP: 158.219.100
        IP: 158.219.100
        IP: 158.219.100.200 -> 206.34.72.100
        802.2: Novell 00a024d3ac79 ->          *
        IP:     206.34.72.1 -> 224.0.0.9*
        IP:   206.34.72.100 -> 136.179.70.6
        IP:     136.179.70.6 -> 206.34.72.100
        802.2: Novell  3Com a53afa ->          *
        IP:     206.34.72.1 -> 224.0.0.9*
        802.2: Novell 0020aff50621 ->          *
        ARP: REQ prot: IP   206.34.72.138 ->
        ARP: REP prot: IP   206.34.72.100 ->
        IP:   206.34.72.138 -> 206.34.72.100
        IP:   206.34.72.100 -> 206.34.72.138
        IP:   206.34.72.138 -> 206.34.72.10
        IP:   206.34.72.100 -> 206.34.72.1

        IP: 158.219.100.200 -> 206.34.72.
 '?' for help    DISPLAY: Network
```

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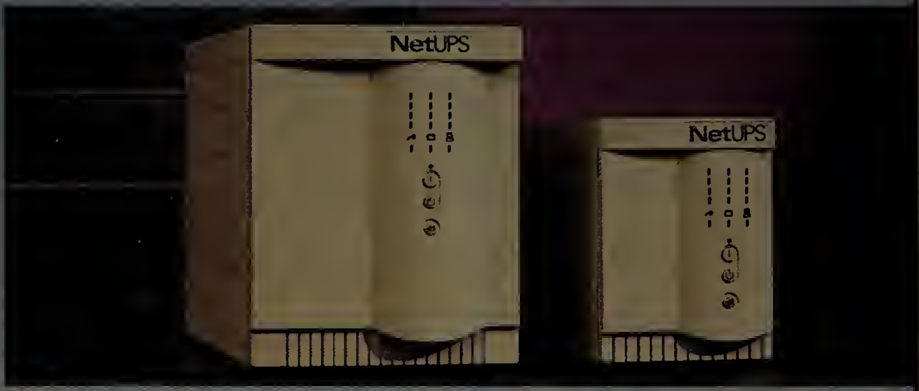

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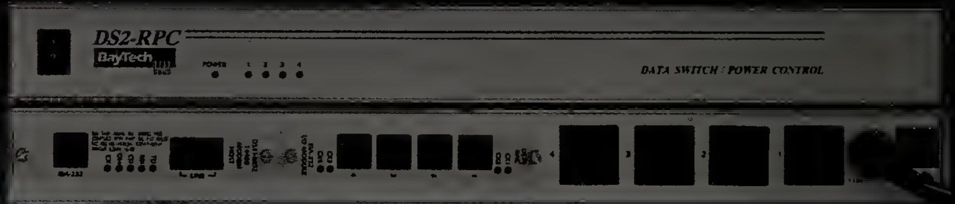

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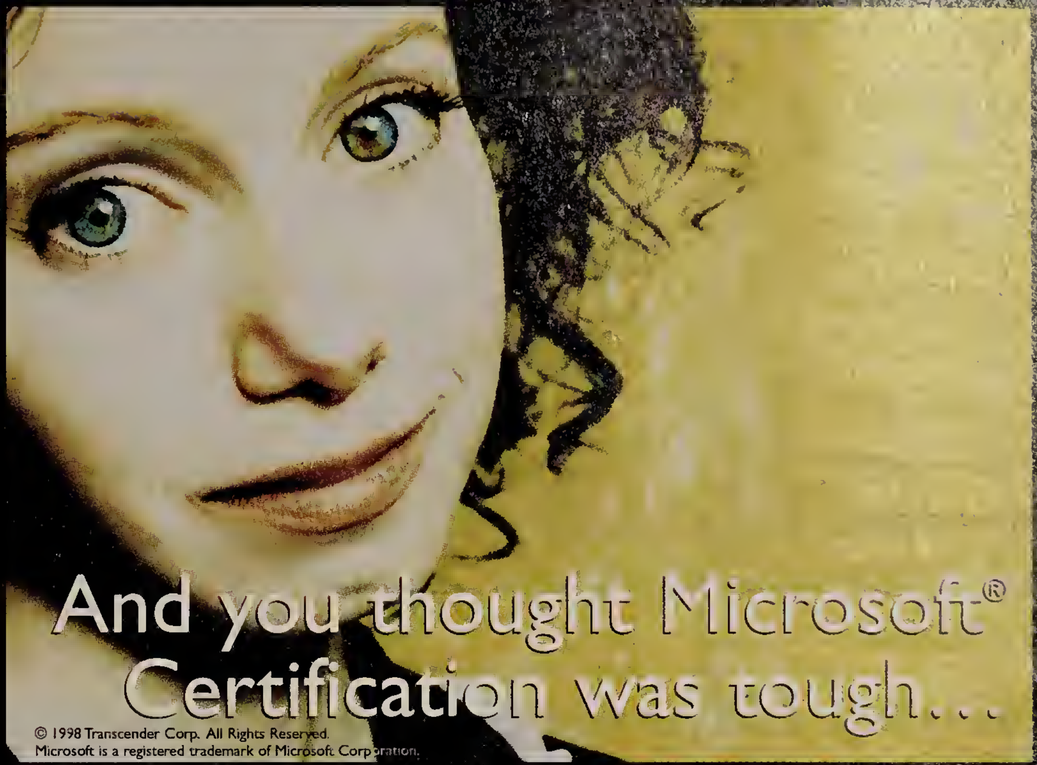
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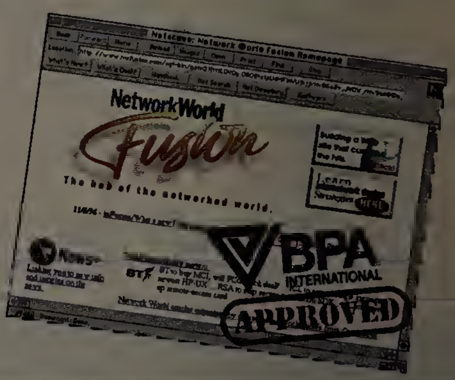

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Cabletron

Continued from page 1

Securities, Inc., in New York. "Benson's the second half of Levine."

Levine was widely viewed as an aggressive, quirky person who created a corporate culture difficult for some to swallow.

Voyages, who estimated he has about a $1 million investment in Cabletron equipment, said last week's events moved Cabletron from "a low-maintenance vendor to a high-maintenance vendor," meaning a vendor he has to watch all the time. He said that in his mind, Cisco Systems, Inc. and Hewlett-Packard Co. are low-maintenance vendors, and that Cabletron used to be one.

To change his view, Voyages said he'd have to see management stability, revenue growth, profitability and continued delivery of innovative products in a timely fashion.

Cabletron's ability to retain a talented work force and deliver products in the future worries other customers as well. Mike Eldridge, network manager at Morehead State University, in Morehead, Ky., said he's always been a satisfied customer but delays in product announcements would indicate a lack of research and development. "If revenues stay flat and their viability as a business becomes questionable, at that point the red flags would go up," Eldridge said.

Donald Reed *is out as CEO of Cabletron after only seven months.*

SHAWN HENRY

Not all customers were unhappy with the change. Bob Courier, director of data communications at Duke University, in Durham, N.C., said, "Something was going to have to happen." With Reed at the helm, "I had concerns about the company's long-term survival."

At least one financial analyst also saw a positive side to the executive shuffle. "The industry became much more competitive in the last six months, which forced Craig's hand," said Paul Johnson, managing director at BancAmerica Robertson Stephens, in New York.

Benson doesn't hedge

In last week's telephone conference with the media and financial analysts, Benson said it was Reed's idea for Cabletron to make a change so that the company could better implement the strategy Reed has outlined in recent months.

"[He] realized that my vast industry experience and my execution abilities allowed me to actually implement that strategy much more effectively than Don could," said Benson in a prepared statement.

"And what [Reed] proposed is that we look at a new way to realign Cabletron, such that he serve as an advisor to me as I implement that strategy," Benson continued.

"So we settled on a strategy by which Don would stay on the board of directors and work as a consultant to the company. In essence, reversing the roles that we had earlier taken with Don's arrival at Cabletron," he said.

However, Reed was not at the conference, and could not be reached last week. A Cabletron spokesman said he didn't know where Reed was.

Reed's wasn't the only departure. By Tuesday, Mark Truhlar, chief information officer and senior director of network management software, and Stephan Gray, director of worldwide marketing and communications, were out. There were conflicting reports about the circumstances, but several observers said it was likely that the executives were fired and didn't resign, as has been reported.

Benson, who has been described as brilliant but arrogant, was asked during the conference call why the change had taken place. His response dumbfounded many listeners: "I think it's safe to assume that Don got into this business, found out how fast-moving it was and realized what an asset . . . I have in my brain — the now almost 20 years of industry experience, plus 15, 16 at Cabletron. Meaning that I can make smart decisions a lot quicker and begin implementing [them] a lot faster than he possibly could," Benson said. ■

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Token ring

Continued from page 1

product manager. Customers are interested in bridging existing token-ring LANs with higher-speed Ethernet and ATM networks, Campbell said.

With that, Cisco plans to tunnel token-ring frames through 100M bit/sec Fast Ethernet links using its InterSwitch Link (ISL) protocol, Campbell said (see sidebar). ISL is Cisco's proprietary virtual LAN trunking protocol for Fast Ethernet.

For ATM, Cisco will continue to offer token-ring LAN Emulation products. And Cisco will continue to participate in the IEEE 802.5 committee that mandates token-ring standards. Campbell said Cisco will develop 802.5-compliant HSTR products if a market develops.

Cisco's departure from the HSTRA will have no impact on the IEEE's 802.5 standards work around High-Speed Token Ring, according to Robert Love, chairman of the IEEE 802.5 committee. He expects the standard to be ratified this summer.

Indeed, all Cisco risks by leaving the HSTRA is a public relations hit; the real work on the standard is being done within the IEEE, members said. Still, some believe Cisco's withdrawal from the alliance can only hurt the HSTR effort.

"That's not good," said Daniel Long, network and telecommunications analyst at Collier County Public Schools, in Florida. "We're getting ready to go out on bids for new routers, and that's one of the specifications that we're going to require."

Bad intentions

Others say Cisco's departure connotes nefarious intentions.

"Cisco is attempting to torpedo multivendor, industry-standard HSTR efforts and promote, instead, the Cisco proprietary ISL technology," said Kevin Tolly, president of The Tolly Group, a catalyst behind the formation of the HSTRA. "Cisco has decided to make a preemptive strike against those vendors in an attempt to eliminate IEEE 802.5 HSTR from serious consideration by network managers and make ISL a de facto industry standard."

"They obviously do not stand behind their token-ring customers; [they] want to lock them into proprietary solutions," said Jorgen Hog, vice president of network product marketing for HSTRA member Olicom, Inc., a token-ring development partner of Cisco's.

Others, though, said Cisco's move is indicative of business reality.

"The question is whether Cisco's withdrawal will have any effect on the market [for High-Speed Token Ring]," said David Passmore, president of NetReference, Inc., in Sterling, Va. "I think the answer is no, because there was no market to start with."

Some HSTRA members seem to support Passmore's view. Bay Networks, Inc. is holding off on product development until a market emerges, said Jeff Clowers, token-ring switching product line manager. And 3Com Corp. last week played up its ability to transmit token-ring frames at 100M bit/sec over Fast Ethernet using the IEEE 802.1Q virtual LAN standard — a method that's virtually identical to Cisco's.

Conversely, IBM, Madge, Olicom, Inc. and Xylan Corp. are actively developing HSTR-compliant products, officials from those companies said.

IBM is developing 100M bit/sec token-ring network interface cards for release in the third quarter, and modules for the 8260, 8265 and 8270 hubs and switches for early 1999, said Dave Olechovsky, token-ring product line manager at IBM and HSTRA chairman. Madge said it will show HSTR switches and adapters at NetWorld+Interop 98 next month in Las Vegas and ship the products by year-end.

Aside from Olicom, HSTRA members largely shrugged off Cisco's defection.

"I hate to see them drop out because they've been helpful," Olechovsky said.

Olechovsky said Cisco did not try to force ISL upon the alliance: "They were really very helpful in terms of us pursuing a native [token-ring] standard" as well as an encapsulated approach like ISL, he said.

Cisco does not have as much at stake in token-ring as the other HSTRA members do.

Of the $141.8 million in worldwide switched token ring revenue for 1997, Bay, Madge, Xylan and IBM accounted for 66% of the market, according to the Dell'Oro Group of Portola Valley, Calif. Cisco had a 10.6% share, while Olicom and 3Com grabbed 7.6% and 5.5%, respectively.

Cisco is the second company to defect from the HSTRA. Texas Instruments, Inc. backed out last fall (*NW,* Oct. 6, 1997, page 38). ■

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Cisco adds up fast Ethernet for token ring

Even though Cisco Systems, Inc. backed out of the High-Speed Token Ring Alliance (HSTRA), it's not backing away from high-speed token ring.

Cisco last week unveiled two-port Fast Ethernet modules for its Catalyst 3900 token-ring switch, and 7200 and 7500 routers that support the company's InterSwitch Link protocol (ISL). ISL is a virtual LAN trunking protocol for Fast Ethernet that Cisco claims can also be used to run token ring at 100M bit/sec.

Though the new modules can support token ring, they are really intended to migrate token-ring users to Fast Ethernet. Cisco does not see a market developing for 100M bit/sec token-ring, and that's the reason it bowed out of the HSTRA.

"Cisco has got options, but given a choice they would migrate people to Fast Ethernet," said Anura Guruge, an independent consultant in Meredith, N.H. "Token ring is never going to get down to [Fast Ethernet] prices."

Cisco also announced the 24-port stackable Catalyst 3920 token-ring switch. The 3920 can be stacked with the existing 20- to 28-port 3900 to configure a switch with 224 token-ring ports.

The Fast Ethernet cards for the 3900 cost $1,495 for copper and $1,795 for fiber. The Fast Ethernet boards for the 7200 and 7500 routers cost $3,800 for copper and $5,000 for fiber.

The Catalyst 3920 costs $250 per port. All of the products will be available later this quarter. Cisco can be reached at (408) 526-4000.

–Jim Duffy

AT&T

Continued from page 1

centers here and in eight other locations around the world, GEMS 6.0 dramatically increases AT&T's reliance on tools from vendors of network operating systems, internetwork devices and network management software (see graphic). GEMS 6.0 represents a sharp departure from AT&T's legacy of using purely home-grown systems.

AT&T initially plans to test remote server monitoring, via the company's GEMS platform, with four outsourcing customers. After this test, the carrier plans to commercialize the server monitoring service under the name Network Computing and Premise Service, said Rick Roscitt, president of AT&T Solutions, the carrier's outsourcing and managed services unit.

Agents on servers

A key component of GEMS 6.0 is Houston-based BMC Software, Inc.'s Patrol application server management tool. Patrol places an autonomous agent known as a Knowledge Module on each managed server, along with a set of application discovery and management rules.

AT&T initially is utilizing Knowledge Modules for Lotus Development Corp.'s Notes and Microsoft Exchange, said Tony Muth, AT&T Solutions' senior architect for network computing. AT&T may also implement BMC's modules for enterprise resource planning software suites from SAP AG and others, he added.

In addition, AT&T has developed its own Patrol Knowledge Modules for functions such as system logging. "And we're offering to custom develop [modules] for cc:Mail and other messaging programs," Muth said.

A stated goal

Pushing carrier network management into the LAN has been a stated goal of AT&T's ever since the company established Managed Network Solutions as a business unit with profit-and-loss responsibility in January 1997. At the time, business unit officials said they hoped to announce outside vendors to manage hub, server and desktop elements. But the project appeared to run aground last year amidst AT&T's corporate upheaval and as a result of the company's historic antipathy toward partnerships.

However, the project gained new life late last year with the arrival of AT&T Chairman and CEO C. Michael Armstrong. Eyeing the shrinking margins on both voice and data transport services, Armstrong has charged AT&T Solutions, which now includes Managed Network Solutions under its corporate umbrella, with achieving $4 billion in annual revenue by 2002.

That will require at least a 30% annual growth from now until then, Roscitt said.

Roscitt also told *Network World* that AT&T is scouting around the U.S. for network integrators to acquire and may make two purchases soon. However, he did not cite any specific acquisition candidates and cautioned that the companies AT&T buys would probably not be household names.

Still, those moves may help jump-start the carrier's entry into LAN management.

Although AT&T Solutions already offers full enterprise network outsourcing short of staffing up data centers, even the company's largest customers have tended to engage the carrier only for WAN management.

For example, Citibank recently selected AT&T Solutions for a managed global frame relay and IP network in a five-year, $750 million contract. But Citibank will stick with Digital Equipment Corp. and EDS Corp. for desktop and LAN outsourcing, said Stan Welland, head of the bank's Global Technology Infrastructure Division. ■

AT&T WARMS UP TO THIRD PARTIES

Key commercial components AT&T has built into its GEMS 6.0 management platform:

Vendor	Product	What it does
BMC Software	Patrol	Application server monitoring and management
Hewlett-Packard	OpenView and IT/Operations	System for alerting technicians whether end nodes are up or down
Lucent	Trouble Tracker and G3MA	PBX monitoring and reporting
MAXM	MAX/Enterprise	Translation of datastreams from legacy systems into SNMP traps
Microsoft	Systems Management Server	Remote management of Windows NT servers and desktops
Remedy	Action Request System	Integrated trouble-ticketing system

Note: For specific devices, GEMS can also integrate element management systems, such as CiscoWorks, Bay's Optivity and Cabletron's Spectrum Portable Management Application.

Bay to unveil probe with embedded Java applet

By Jim Duffy
Santa Clara, Calif.

Bay Networks, Inc. this week will throw a Java twist into LAN monitoring with a pocket-sized probe that sports an embedded Web applet.

The Series 1000 Ethernet Web PocketProbe is a 4-by-6-inch device that gathers Remote Monitoring and RMON 2 statistics from a single Ethernet segment. It features an Intel i960 Reduced Instruction Set Computing CPU, a single Ethernet port and a serial configuration port that connects the probe to a network manager's workstation.

Bay's Series 1000 Ethernet Web PocketProbe *gathers RMON statistics.*

This workstation can serve as a Java-based graphical user interface (GUI) for viewing LAN statistics collected by the Series 1000 Ethernet Web PocketProbe. The Java GUI comes from an applet embedded in firmware within the PocketProbe.

This firmware applet is launched when the network manager activates the probe from the serial-attached workstation.

The applet allows the manager to view data on network health, such as network usage and packet destination, server availability and network response time through pie charts, meters, bar graphs and list memo boxes, Bay said.

The Java-based display is continuously updated with network performance information. This is in contrast to other LAN probes and monitors that feature a static HTML-based Web interface that requires manual refreshing.

Network managers can also use the Java GUI to configure the PocketProbe, Bay said.

The Series 1000 Ethernet Web PocketProbe costs $1,495 and is available now.

© Bay: (800) 822-9638

New switch sells for Extreme-ly low price

By Robin Schreier Hohman
Cupertino, Calif.

Gigabit Ethernet vendor Extreme Networks today introduced a high-density feature-packed 10/100M bit/sec switch with an estimated street price of $100 per port — at least for Layer 2 switching.

The Summit48 Enterprise Desktop Switch features two Gigabit Ethernet uplinks with two redundant gigabit links. The switch also provides an aggregate throughput of 17.5G bit/sec with a nonblocking switch fabric.

Users can add Layer 3 capabilities for an estimated $50 per port. Users can buy the switch with Layer 2 turned on and then get a software key to upgrade to Layer 3.

It's a clever marketing idea because Layer 3 switching is already built into their chip, according to Michelle McLean, an analyst at META Group, Inc., in Burlingame, Calif. By making Layer 3 switching optional, the company is able to offer an extremely low entry price.

Hans Baartmans, the Unix network administrator at Texas Instruments, Inc., in Dallas, has been evaluating a fully connected beta version of the Summit48 for about a month. "I've had no complaints from anyone," he said.

Extreme is trying to nab users that might be tempted by the Bay Networks, Inc. 350T, a 16-port 10/100M bit/sec autosensing switch. But for Mart Molle, professor of computer science at the University of California, Riverside, it would take five 350Ts to get the same number of 10/100M bit/sec ports he gets with the Summit48, and he wouldn't get the Gigabit Ethernet uplinks. "The thing that's amazing about this is the price," he said. "Universities are poor and I'm very conscious about cost per port."

Extreme can give this price performance ratio because the company is "well down the cost curve of the [Application Specific Integrated Circuits]," said Gordon Stitt, president and CEO of Extreme. "This product uses the same silicon as our Summit1, 2, 3 and 4 so that the custom ASICs have been in high-volume production."

Analysts were not surprised that a company such as Extreme was able to break a price barrier. "To get in the door you have to be leading on price," McLean said. "Innovation and price leadership come from start-ups," she said.

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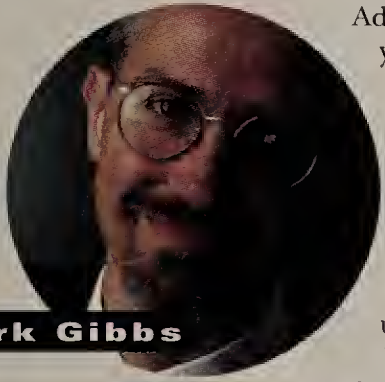
Backspin

Addicted to your apps, rare and well-done

Over the last couple of weeks I have discussed digital media in terms of the message (text, video and music) and the medium, the tools used to access the message (applications such as Web browsers).

In the digital world, the medium and the message are very different and far more powerful than anything that has gone before.


Mark Gibbs

For evidence of that, consider Marshall McLuhan's often-abused quote: "The medium is the message." This is actually a deep insight into the relationship between the means of communication and the content: What you can communicate is wholly dependent on the medium used.

The medium defines and constrains the context of the communication. But the digital medium is inherently much less constrained than traditional media because of its malleability. This makes it much more powerful.

Note that I'm referring to the digital "medium" rather than "media." The reason is that when the content is digital, the distinction between video, text and any other type of content is merely a matter of context. They become components of the digital medium, sub-media if you will.

Indeed, many sub-media are convertible into other sub-media — text to graphics, for example, or video to still images.

But the digital medium is evolving in such a way that neither the message nor the medium stands alone.

In order to deliver a more compelling message, the message is becoming inseparable from the medium — to misquote McLuhan: "The medium is becoming the message. And vice versa."

Even more profoundly, the digital medium is becoming programmable. This is an entirely new dimension that not only makes the digital medium different, but also potentially makes the messages it can carry far richer.

For example, traditional video runs from beginning to end. You can fast forward and rewind, but that's all you can do. Translate that into digital video, and the least you can do is to skip forward and backward randomly.

Add software and you could search for specific images (find the next time Groucho Marx appears) or sounds (find the next gunshot or even the next use of the word 'gun').

Add programming and you can annotate areas, frames or sequences.

You can add links and jump to other points in the video or to different sub-media. You name it, and the digital medium can do it.

But as we discussed last week, publishers have to come to grips with the fact that a byproduct of the digital medium is ease of duplication; no antipiracy mechanism will ever exist that can't be hacked.

This means you can't ensure that you'll get paid for every copy of your product. So how do you induce the consumer to pay you? Get 'em hooked. Make digital medium products addictive.

As long as a flow of timely, relevant content is part of the digital medium application, people will be more than ready to pay for it rather than wait around for an opportunity to copy the content.

In the consumer sphere, timeliness, novelty and personalization will be the keys to successful digital medium products. The "I want it now" ethic of the marketplace will be reinforced by aggressive vendor marketing, making the demand for novelty a key factor in consumer purchasing more than ever. This will make copying much less appealing.

The comedian Ernie Kovacs once described television as a medium that was "neither rare nor well-done." To be successful, digital medium products will have to be rare (specifically tailored for the target audience and relevant) and very well-done.

Addictions to nwcolumn@gibbs.com or get hooked at (800) 622-1108, Ext. 7504.

'NET BUZZ

The latest on the Internet/intranet industry

By Chris Nerney

MAKING MARKETERS LIKABLE **Ana Shukla** has made us like marketers.

Alright, perhaps we exaggerate slightly, even recklessly. But at the very least, the founder and CEO of **Rubric, Inc.** has convinced us that marketers wouldn't seem nearly so annoying if they had better tools to do their jobs.

This is exactly what Shukla says her start-up has developed with Rubric Enterprise Marketing Automation (EMA) 1.0, a Web-based application created to help marketers better target customers and accurately measure the dollar impact of their efforts.

Due to be released next week, EMA 1.0 automates online marketing activities to help companies capture and leverage information that too often lays scattered across various data sources, unnoticed and unloved, destined for a synergy-free existence.

Shukla, a native of India and a veteran Silicon Valley marketing pro (**mFactory, Uniface, Vision Software Tools**), says the information revolution has led to the development of computer automation programs used in manufacturing, sales, customer service and other areas of business.

"Only marketing has been untouched," she says.

EMA 1.0 performs "lead mining" for corporate marketers. The product transforms raw leads into qualified prospects by guiding marketers through profile-driven online interactions that culminate, if all goes well, in the prospects writing the marketers some big fat checks. This allows companies to develop more targeted — and therefore more profitable — marketing campaigns.

(Hey, if it cuts down on spam, we're all for it.)

The product also includes revenue tracking features and pre-built reports on data, such as leads per region, cost per lead and the return on investment of any marketing campaign.

Written entirely in Java, EMA 1.0 works with standard commercial Web browsers, Web servers and relational database management systems. The software runs on several **Microsoft, Oracle** and **Netscape** servers and costs between $150,000 and $220,000.

Based in San Mateo, Calif., Rubric was founded in early 1997 and last fall raised $5.1 million in venture funding from **Menlo Ventures, Brentwood Venture Capital** and **Cambridge Capital Fund.**

SMELLS LIKE A SELL-OFF Just four months after an initial public offering (IPO) of stock that raised $38.3 million, Internet services start-up **USWeb Corp.** and some of its shareholders were back on Wall Street, seeking to sell nearly six million shares at $22 each.

Since launching its IPO last December at $7.50 per share, USWeb has seen its stock price steadily rise to more than $20.

Most of this increase can be attributed to good word-of-mouth, as USWeb is a favorite among many brokers and other industry watchers. These observers like the company's strategy of building an international network of Internet service providers through the acquisition of smaller, regional service vendors. The target market is large and mid-size companies with Web sites.

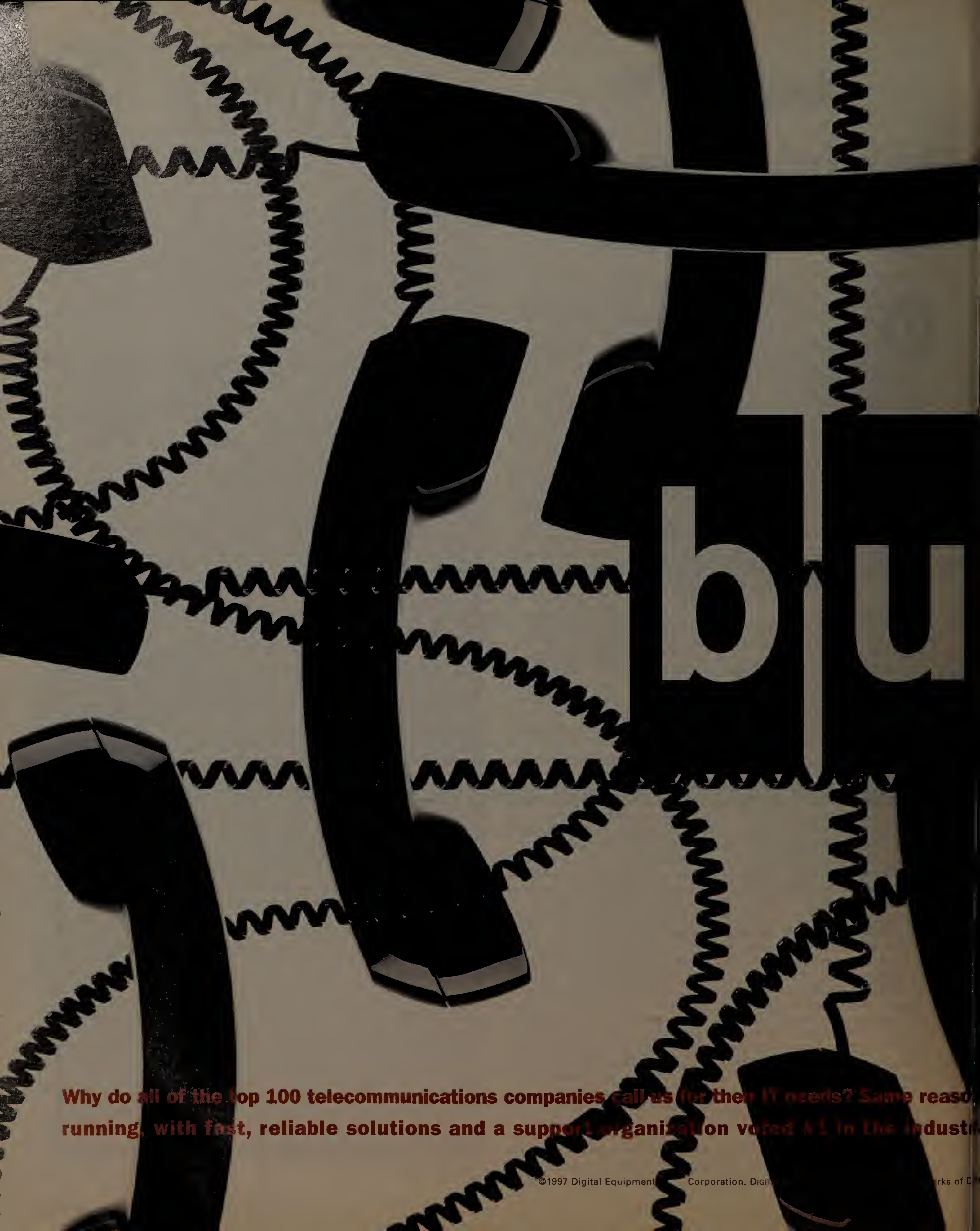
But USWeb is an implosion waiting to happen. Revenue isn't even coming close to keeping up with spending. In 1997, sales were $19.3 million, a meager amount compared with the $72 million in debt racked up through the end of last year. Such Reagan-esque deficits will only increase as the Santa Clara, Calif.-based company continues its buying spree.

The real story of last week's share offering is in who was selling. Only one million of the 5.95 million shares were sold by USWeb. The remainder were sold by insiders who essentially tripled their investments in a matter of months.

Critics of USWeb have said the company cannot survive under the weight of its debt, and the real strategy all along has not been to build a business, but to jack up stock prices and then sell out.

That may have happened last week.

'Net Buzz needs you. Well, we don't need you personally; we're not codependent or anything. We just need your best Internet- and intranet-related news tips. Contact Chris Nerney at (508) 820-7451 or cnerney@nww.com.



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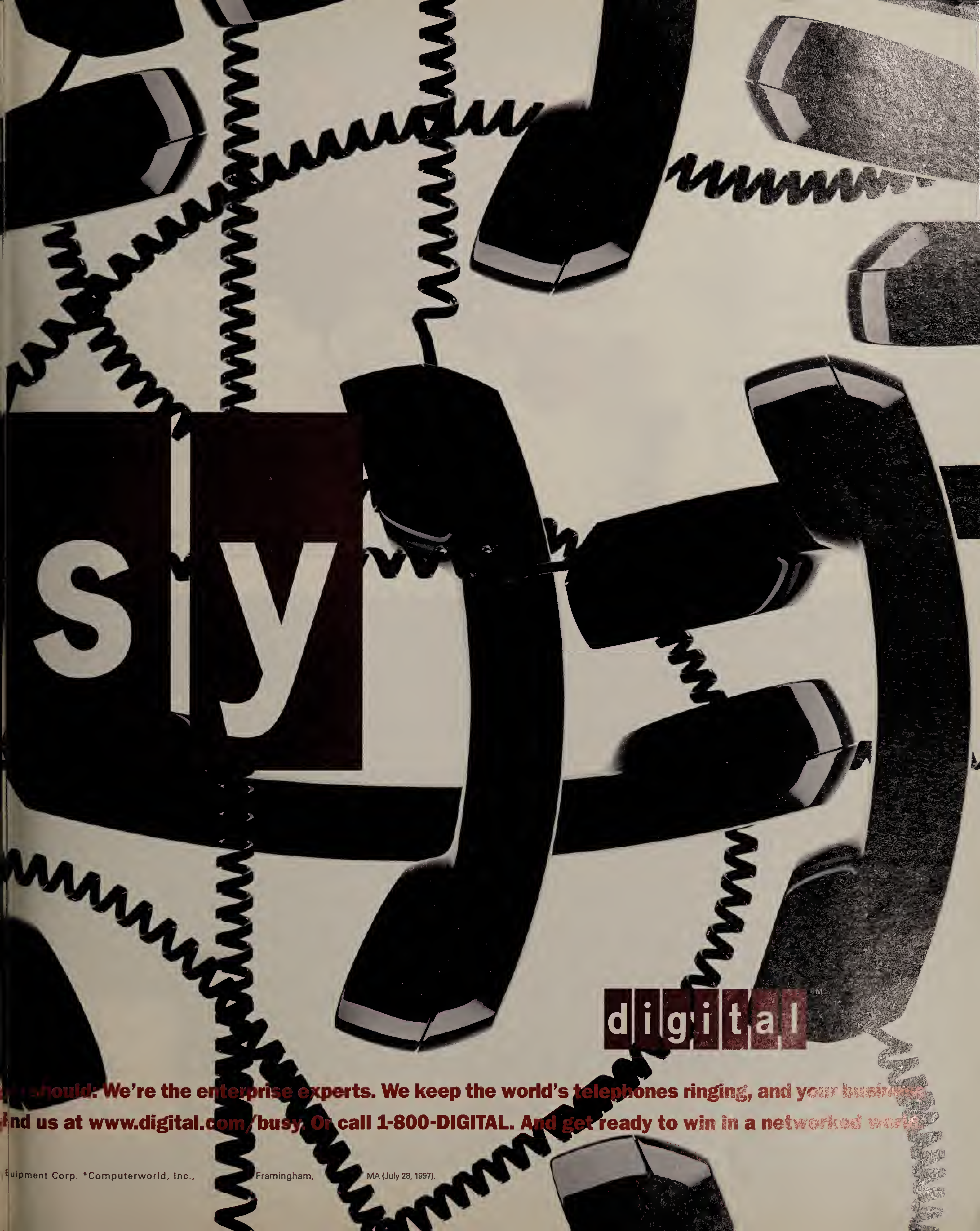

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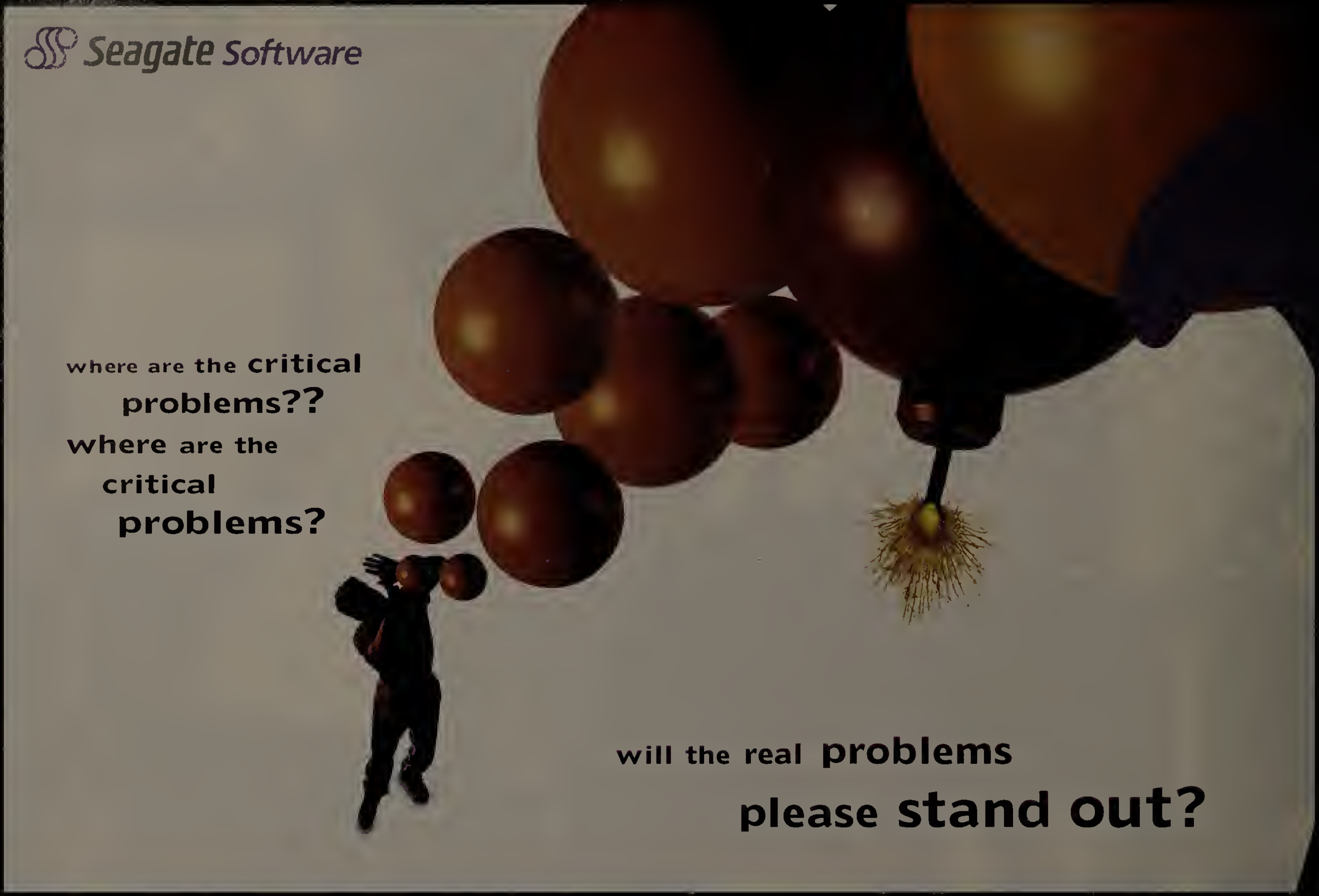
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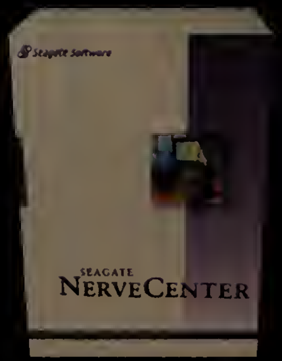

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☐ O. Training/Education
☐ P. Other Professional

4) I specify, recommend, approve, purchase or influence the purchase of the following computer products or services: (check all that apply)

☐ A. Network Interface Cards
☐ B. Hubs
☐ C. Switches
☐ D. Networks OS
☐ E. Groupware/Email Servers
☐ F. File/PrintServers
☐ G. Application/Database Servers
☐ H. Communication/Fax/Terminal Servers
☐ I. Bridges/Routers/Gateways
☐ J. Remote Access Products
☐ K. Network Management Systems/Software
☐ L. Network Security
☐ M. Network Monitors/Analyzers/Network Test Equipment
☐ N. Web Browsers/Search Tools/Engines
☐ O. Web Servers
☐ P. Web Server Management
☐ Q. HTML Authoring Tools/Other Development Tools
☐ R. Audio/Video/Multimedia Enabling Tools
☐ S. Web Publishing Tools
☐ T. Firewall/Security/Encryption Software
☐ U. Transaction Processing
☐ V. PBX Systems
☐ W. Videoconferencing
☐ X. Computer Telephony

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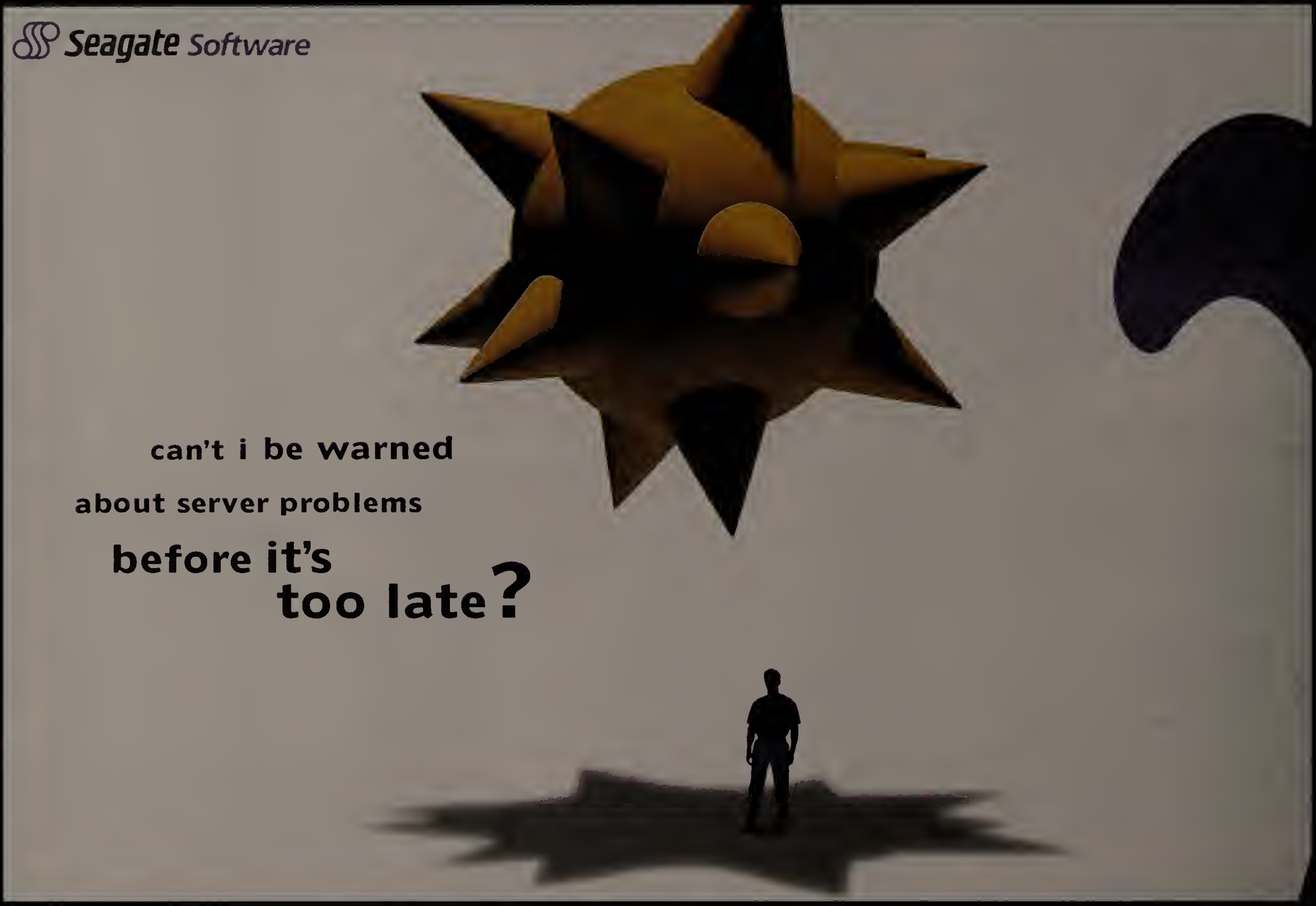

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